FARMERS DIGEST.

JUNE, 1945

Volume 9 — 25c a Copy

Number 2 — $2.00 a Year

Revolutionary Feeding Discovery . . . *Farm Journal & Farmer's Wife* 1
An Easier Way to Harvest Hay . . . . . *American Agriculturist* 5
Cutting Building Costs in Half . . . . . *Farm and Ranch* 8
Maintaining Productivity . . . . . *California Cultivator* 9
Preventing Poultry Diseases . . . . . *Everybody's Poultry Magazine* 13
"Vacuum Cleaning" Clover Seed . . . . . *The Michigan Farmer* 16
Keep Them Burping . . . . . *The Jersey Bulletin* 17
Few Bulls Become Great Sires . . . . . *The Shorthorn World* 21
Rodeo . . . A Little of Its History . . . . . *Hoofs and Horns* 26
A Leak in Dairy Farm Profits . . . . . *Holstein-Friesian World* 33
Growing Trellis Tomatoes . . . . . *Market Growers Journal* 37
Fire Fighting Methods and Equipment . . . . . *Agricultural Engineering* 42
He Rebuilds Georgia's Soil . . . . . *The Commercial Appeal* 47
Good and Bad Health Is Traced Back to Soil . *St. Louis Post-Dispatch* 55
Trends in Pasture Improving Methods . . . . . *The Ayrshire Digest* 61
Soil Management in Young Orchards . . . . . *New England Homestead* 65
Gestation Periods of Five Breeds of Cattle . . . . . *The Cattleman* 68
Potato Seed Determines the Production Possibilities . . *Penna. Farmer* 70
Lamb Pastures . . . . . *Sheep Breeder* 73
Sulfa Drug Immunizes Peach Trees . . . . . *Report of Progress* 74
Phenothiazine Boosts Steer Gains . . . . . *American Hereford Journal* 76
Does Farm Forestry Pay? . . . . . *The Southern Planter* 79
Vaccinate for Protection . . . . . *American Poultry Journal* 81
Anemia in Pigs Can Be Checked . . . . *American Hampshire Herdsman* 84
For the Farmer's Library 85
Index 87

The Farmer's Digest

EDITORIAL STAFF:

Editor—L. Bush-Brown Assistant Editor—C. Leavitt Dyer
Business Manager—A. E. Heick
Associate Editors—
John A. Andrew, Jr., James Bush-Brown, Ruth Patrick

ADVISORY EDITORIAL STAFF:

William A. Albrecht
Chairman, Department of Soils
University of Missouri

John D. Beck
Professor of Veterinary Medicine
University of Pennsylvania

Hugh H. Bennett
Chief, U. S. Soil Conservation Service

D. B. Johnstone-Wallace
Assistant Professor, Department of Agronomy
Cornell University

H. J. Reed
Dean of the College of Agriculture
Director of the Experiment Station
Purdue University

W. T. Spanton
Chief, Agricultural Education Service
U. S. Office of Education

Howard B. Sprague
New Jersey Agricultural Experiment Station

M. L. Wilson
Director of Extension Work
United States Department of Agriculture

The Farmer's Digest
Published Monthly at Ambler, Pennsylvania
by the Farmer's Digest, Inc.

25c a Copy *1 Year $2.00*
2 Years $3.50 *3 Years $5.00*
Foreign and Canadian Subscriptions $2.50 a Year

Entered as second-class matter at the Post Office at Ambler, Pa., May 5, 1937, under act of March 3, 1879

The Farmer's Digest

Volume 9 June, 1945 Number 2

Revolutionary Feeding Discovery

Condensed from Farm Journal and Farmer's Wife

Carroll P. Streeter

THE thyroid, located in the necks of farm animals (and human beings) is one of a half-dozen little ductless glands that do nothing less than run the body.

The thyroid controls growth. It determines the rate at which the body burns food and turns it into energy, milk, eggs, wool or meat. It is a damper that blows the fire hot or damps it down. It influences breeding ability.

Yet in a dairy cow it is no bigger than a good-sized plum. In a human it is the size and shape of a small butterfly with its wings spread.

Now the experimenters have found that they can manipulate this thyroid gland by drugs. They can get the same effect as if they were speeding it up. And they can slow it down.

By feeding the speed-up drug they can:

1. *Increase butterfat* production in most dairy cows by 20% to 50%. They can raise the test of the same cow's milk from ½% to 1%—something never before accomplished.
2. *Increase milk* production 10% to 20% in dairy cows, and help beef cows nurse their calves.
3. *Probably lengthen* the high-producing period of a cow's life.
4. *Increase egg production* in chickens 10% to 20% by preventing the usual hot-weather slump. Also hasten feather growth and make combs brighter red.
5. *Speed up growth* in young animals by 10%, bringing them into production earlier or getting them to market sooner.
6. *Keep horses vigorous* longer.
7. *Improve breeding ability* of any male animal. It's already been done with both beef and dairy bulls, rams, jacks and bucks. Probably it will do the same for females, but this has not yet been tested. It may also help prevent abortions not caused by Bang's disease.

Reprinted by permission from Farm Journal & Farmer's Wife, Philadelphia, Apr., 1943

8. *Make it possible* for rams to breed in summer. Experiments on ewes will be next.

Just as astonishing is the action of the drug that *slows* the thyroid. This can:

1. *Fatten animals faster* with the same feed. Instead of running it off in energy in the barnyard they put it on their backs.
2. *Produce less frame*—such as shorter-legged chickens.
3. *Decrease breeding ability.* Hence it would be fed only to market animals.
4. *When given to human beings* having toxic goiters (caused by over-active thyroids) it likewise slows *them* down.

This may mean that with relatively few exceptions goiter operations may soon be unnecessary. And even for operations that must still be done, this new drug is far superior to anything ever used in helping to assure a successful outcome.

Three Cents a Day. After reading such surprising claims let's take a long breath and go back to see how it all came about.

In 1934 Dr. W. R. Graham, Jr., a Canadian scientist, discovered that by feeding cows dried, ground-up, thyroid gland he could produce more milk and butterfat. Scientists at the University of Missouri, led by Drs. C. W. Turner and E. P. Reineke, were excited by the possibilities and started further research. It is still going on.

They could get the same results all right. The trouble was that "thyroid powder" cost $10 to $15 a pound. No farmer could pay that and get his money back at the milk pail. So Turner and his associates set out to discover a cheaper drug.

They found it when, one day, they added iodine to skim milk. This produced a brownish powder called thyroprotein. It contains thyroxine — the identical hormone the thyroid gland secretes. But it is 20 times more powerful than the gland's own product! It can be fed to cows at probably 3 cents a day. That unlocks the door and lets farmers use it.

The only catch is that the Food and Drug Administration has not approved it, so it cannot yet be sold. The FDA wants to be sure that no thyroxine is carried in the milk or eggs to human beings, else the humans would be speeded up just as the cows and hens were.

To satisfy Food and Drug authorities a test is now being run on 20 babies in the New York City Postgraduate Hospital. A ruling is expected to be made in perhaps 90 days.

Fifteen State Colleges of Agriculture are now experimenting with thyroprotein—observing effects, testing dosages, etc. So far

their results agree with Turner's.

For Humans, Too. For the story of the drug that *slows* the thyroid I went to the Harvard Medical School. There Dr. E. B. Astwood tested 103 compounds —first on thousands of rats, then on human patients—and came up with two drugs that appeared good. The better one is thiouracil, the other thiourea.

The Lederle Laboratories have distributed thiouracil to every medical college in the United States and Canada, to agricultural experiment stations, and to many practicing physicians.

Thiouracil is also not yet approved by the Food and Drug Administration but is under consideration.

Now Dr. Astwood is experimenting with a new series of 130 compounds, and feels confident that still better drugs will be discovered "in the near future."

Broiler Fattened Fast. By using thiouracil, Dr. Turner found that he could fatten Leghorn broilers as much in two weeks as he used to in ten. A farmer might feed thyroprotein to a steer calf to speed up his early growth, then substitute thiouracil and fatten him up in a hurry. And with less feed, at that!

In 75% of dairy cows, thyroprotein will increase production of both milk and butterfat any time after they hit their early peak, soon after freshening. Some cows respond more than others. All of them show most improvement in summer, when hot weather ordinarily slows the thyroid gland.

All of this has been demonstrated over four years of constant testing with the University of Missouri dairy cows, and with tests made on a half-dozen ordinary farm herds. The cows start to give more milk and butterfat within four or five days after the thyroprotein is started.

Here may be the answer for the man whose cows give enough milk but test too low to give "legal" milk.

"But," you may ask, "won't all this burn up the cow? Won't it wear out a hen?"

"No," says Dr. Turner—"not if given in the right dose. The dose varies with individuals. Any good herdsman could tell how much to give by watching the cow's body weight (the chief indication), by her coat, and by her nervousness." Anyway, most cows are butchered long before they would die a natural death.

When I saw the University of Missouri dairy herd I couldn't tell which cows were being fed thyroprotein. They looked alike and acted alike. As for the chickens on test, I doubt that you could find better-looking Rhode Island Reds anywhere.

"We have fed thyroprotein to

some of our hens for 2½ years without ill effect," says Dr. Turner. "They did better the third year than they did the second. Three-year-old hens on thyroprotein laid more eggs than pullets did without it.

"Two pullets fed thyroprotein laid 329 and 323 eggs in a year's time and have not stopped laying, nor molted, yet." (March).

More research will be needed, both on farm animals and human beings, before widespread use can be made of either thyroprotein or thiouracil. Also, the Food and Drug Administration must first approve them. But it looks as if the researchers in animal physiology are hot on the trail of one of the biggest finds since the vitamins.

Curing Baled Hay in the Barn

Last year a barn hay dryer was installed on the farm of Howard VanDerlike in time for the second cutting of alfalfa. Semi-green second cutting alfalfa was baled as loose as the baler could tie it with twine. This was placed in the barn so as to form an enclosure around the main duct of a Tennessee type barn hay dryer system. Laterals were removed, and the bales were laid up much like brickwork, being careful to lap the joints. Holes between the bales were stopped with loose hay. A thickness of three bales was placed on the sides, ends and over the top. All the bales from 5 acres of hay were used which made a considerable pile. The air space in the center was maintained so that nowhere did the air have to pass through more than three bales of hay. Hay was brought in toward night and had already begun to heat. Some doubt was expressed as to whether the air would pass through the bales. Worries were soon over. Two hours after the fan was started the hay had cooled down. At the end of 10 days the hay was completely cured. Examination of the inside of some of the bales showed the hay to be of excellent quality with no evidence of mow burn. Another unit has been purchased and it is planned to stack the bales outside, protecting them from the weather with a canvas or with long loose hay. No duct work will be required as the bales will be so placed that they will form a passageway in the center for the air.

Many farmers are interested in Mr. VanDerlike's experiment as it offers a solution to their problem of drying baled hay.

—*Electricity on the Farm*

An Easier Way to Harvest Hay

Condensed from American Agriculturist

Ivan R. Bierly, A. F. Gustafson and Paul R. Hoff

"With our buckrake and blower, we have saved two-thirds of the hard work in making hay." This statement of Oscar and Hans Weinert at South Byron, Genesee County, New York, was made last summer. Hans Weinert brought the hay to the barn with a buckrake, while Oscar Weinert pitched the hay into the "blower," which was simply the wind stacker from an old threshing machine. The buckrake eliminated the hand work in the field, and the blower saved much of the hard, hot work up in the mow.

These two brothers, both in their fifties, put in about 100 tons of hay on their two farms in 1944. A couple of years ago, they had two sons and a hired man to help them do the same job. "We knew we had to do the job alone this year, and after talking with other farmers who had used buckrakes and blowers we decided to try it ourselves," they reported.

Alton I. MacDuffie at Pavilion Center, New York, first used an old threshing machine for putting combined barley straw in the mow in 1940. He brought the straw to the barn with a buckrake. He also used the buckrake to haul his hay to the barn, where he put it into the mow in the usual way.

Two years later he removed the rear end of the threshing machine, including the fan assembly and blower pipe, and mounted it on wheels for ease in moving the outfit around. His next step was to use the blower for mowing away his hay as it was brought to the barn with buckrake. During the last two years, six neighboring farmers have started to use the combination.

The buckrake drops the hay on the ground alongside the blower. The hay is fed into the blower by hand, with a pitchfork. Obviously, all of the hay is pitched by hand, but, as Mr. MacDuffie said, "At least we stand on solid ground while we pitch it, which is a lot easier than walking on the loose hay in the mow."

The buckrake picks up the hay in the field by simply sliding the teeth under the hay as it moves along the windrow. The hay is quite loose when it arrives at the barn. The work of separating it into bunches that will go through the blower, therefore, is light

Reprinted by permission from American Agriculturist, Ithaca, N. Y., March 3, 1945

compared with that when hay is loaded on a wagon and packed by walking on it. Pitching buckrake hay into the blower is much easier than to tear the hay apart in the mow. Furthermore, the work is done out in the open air.

As Mr. MacDuffie pointed out, the hay is broken up somewhat as it passes through the fan, but "since all of it goes into the mow," he rates it just as good as other hay for feeding. On the basis of three years' experience with the buckrake-blower combination, he concludes that he "can put the hay into the mow slightly greener than with a hay fork. The reason is that the blower pipe distributes the hay evenly and avoids hot spots in the center of the mow where the hay is packed by dropping from a fork." Furthermore, he says, "There is a constant stream of air passing over the hay while the blower is operating."

Mr. MacDuffie's first blower had a pipe 12 inches in diameter. In 1944 he bought another blower which has a 14-inch pipe. The blower cost him about $15.00, and he added about $45.00 for parts and labor to get it home and mount it on wheels so it can be readily moved.

With his 13-year-old son operating the buckrake and his hired man to help him pitch the hay into the blower, Mr. MacDuffie was putting the hay into the mow at the rate of almost 2½ tons an hour last summer while we were there. We timed the operation one afternoon with stopwatches, and weighed the buckrake loads of hay with Load-o-Meters which are commonly used to weigh trucks on highways.

As an average for the 4 farms with buckrakes and blowers where these time and weight records were obtained last year, two men and a boy were putting in hay at the rate of 2 tons an hour. On these farms the hay was being hauled from one-fourth to one-third of a mile. This was about the same rate as for 3-man crews on a larger number of farms where buckrakes were used with grapple forks or slings at the barn. One of the most important advantages of the buckrake is that it provides a continuous stream of hay coming to the barn; the blower further provides a means of eliminating much of the hard work at the barn.

Cleveland Broadbook, near South Byron, N. Y., and his son and daughter put in more than 100 tons of hay with their buckrake and blower in 1944. His son operated the buckrake and his daughter helped pitch hay into the blower. He emphasized the ease of filling the barn with hay this year "clear up to the peak" with the blower.

Ward Crowfoot, a close neigh-

bor of MacDuffie, put in his hay alone last year. His method was to drop 2 or 3 buckrake loads of hay at the blower and then stop to blow the hay into the mow. Since he alternated at operating the rake and pitching hay into the blower, he didn't get in hay as fast as a larger crew would have with the same equipment, but he felt that he was still getting in his hay just as fast as he could have done with the help of another man and using a hayloader and wagon. In his own words, "I don't know of another way that I could have put in my hay alone in the same amount of time, and without a lot more hard work."

Keeping Eggs Fresh

To keep storage eggs fresh, oil 'em or boil 'em.

The oiling method, according to Dr. W. L. Mallman of Michigan State College, makes it impossible for the average consumer to tell a new-laid egg from one six months old. The boiled eggs will keep for a year, says Professor A. L. Romanoff of Cornell University.

Oil treatment of eggs is not at all new, but it has had disadvantages, especially the oily film left on the shell. Dr. Mallman undertook to improve the process. To a light white paraffin oil (viscosity 50 to 60) he adds 6.25% pentachlorophenol, to kill shell-borne bacteria. He recommends an oil temperature of 70 degrees for dipping.

Dr. Mallman believes farmers can treat eggs on their own farms within a few hours after they are laid. All the farmer will need is a small tank for the oil, an egg basket for dipping the eggs, and a crock to set the basket of dipped eggs in until all excess oil has drained off.

The boiling process is even simpler, if possible. Immerse fresh eggs in boiling water for *five seconds* and air-cool them. That's all there is to it. Dr. Romanoff calls it a "flash heat treatment." What happens is that just enough of the egg white coagulates and sticks to the shell membrane to give the egg a better seal against evaporation than it has in its natural state.

Heat-treated eggs, stored in a refrigerator at 41 degrees for 12 months, were of the same quality as untreated eggs stored for only three months.

Neither the oil nor the flash heat treatment is intended to replace refrigerated storage, but simply to maintain better egg quality in storage.

—Farm Journal

Cutting Building Costs in Half

Condensed from Farm and Ranch

W. S. Foster

BY USING a new method of pouring concrete blocks and other construction innovations, E. L. Fine, supervisor for the Farm Security Administration of El Paso, Texas, was able to build ten farm houses at a cost of $2.80 per square foot. In this section, normal price for home construction usually runs about $6 per square foot.

Concrete block construction has been used for many years, but Mr. Fine has developed a new system of fast pouring which produces 40 blocks at a time. He uses a special steel mold into which is poured the concrete that has been mixed to a rather thick consistency. The mold is laid on a piece of level ground and immediately after the blocks are poured the steel mold is lifted and a new batch poured. The completed blocks are left on the ground to cure.

In making the blocks, which are 4x4x12 inches, an ordinary concrete mixer and four men are used. In this project the four men were paid 60 cents per hour which made the blocks cost approximately 2½ cents each.

The concrete blocks are laid in the wall in such a way that at the end of each block placed lengthwise in the wall, another block is set cross-wise and reaches across to the opposite wall, thereby increasing the strength of the wall and at the same time leaving an insulating air pocket all through the center.

Two other construction practices resulted in savings. The houses have concrete floors covered with asphalt tile. These are comparable to floors seen in public buildings and are quite satisfactory. The roofs are made by covering the rafters with gypsum board instead of lumber and the whole is mopped with hot felt and then covered with rolled roofing.

These ten farm houses which have either five rooms and porch or six rooms without porch were built in 1943 under contract for $2,800 each. The ten farms were purchased by tenant farmers under the Bankhead-Jones Tenant-Purchase program.

Chief advantage of this method of construction is its initial low cost and its low cost of upkeep. In the postwar period, many other farmers are expected to adopt the construction methods used on this project.

Reprinted by permission from Farm and Ranch, Dallas, Texas, April, 1945

Maintaining Productivity

Condensed from California Cultivator

R. E. Stephenson

THE wide gap between the highest yields obtained by the best farmers on good soils and the average production of crops, is indicative of possibilities for improvement. It is not assumed that averages can be raised to the level of the best but only that a material increase in production could be obtained if sufficient attention were always directed to the nutrition of the crop that is in production.

The combined effect of crop rotation and the use of commercial fertilizers, brought the average yield of wheat in England from eight or ten bushels to 30 or 35 bushels. Rotations have been in use about two centuries and commercial fertilizers one century. Ohio investigators estimate that improved varieties have added three bushels and the use of fertilizers seven bushels to the yield of wheat in Ohio. This improvement has occurred largely during the last few years. Someone may argue that the higher the yield the less the opportunity for improvement. But, in the past, high records have stood only for a short time and then someone does the job a little better and increases the yield.

Increased production in the future, as in the past, will come through a better understanding of the needs of growing plants and more adequate means of meeting those needs. Soil has value principally because it will grow crops and its value rises as its productivity is increased. There are two rewards, therefore, for good farming; more profit from better crops and the improved and increased value of the soil.

Three physical properties have an important influence in the suitability of soils for certain crops, and on the yields produced. Texture, identified by such names as silt loam, clay loam and loam, is important because it has so much to do with soil behavior under tillage. Heavy, waxy clays may produce excellent grass for hay, pasture or seed but they are hopelessly unsuited for the production of potatoes. Sandy soils may be ideally suited to melons, but probably will not do so well for corn. Texture, governed by the relative proportion of sand, silt

Reprinted by permission from California Cultivator, Los Angeles, Cal., April, 1945

and clay that make up the soil mass, governs many important activities that take place within the soil and influence crop production. Thus drainage, aeration, availability of moisture and nutrients, and root development and functioning are closely related to properties of the soil for which texture is directly or indirectly responsible.

Effective depth, which is the depth of soil that the crop is able to utilize for growth, may determine whether or not a crop fails or makes a satisfactory yield. Some of the grasses require only a few inches of soil but walnut trees and alfalfa must have good soil several feet deep in order to succeed. Soils may be shallow because of bed rock, claypans, hardpans, sand and gravel or even a water table which is too near the surface. The best soils provide several feet of good root zone to support the deep root penetration necessary for the best yields of many crops.

The structure of the soil is important because it has much influence over tilth, or the physical response of the soil under cultivation. Soils with a mellow crumb structure are sponge-like, easy to prepare for a seedbed and ideally qualified for a young seedling to send out a strong root system and become quickly and vigorously established. Heavy soils with good structure are not much of a problem but without it the soil runs together, cements when dry and is impermeable to both roots and water.

These three properties, texture and effective depth, pretty much determine the production possibilities of the soil. Of the three, only the structure is much subject to change or improvement by good farming. Nature establishes the texture and, for the most part, the soil depth. In the case of wet lands, adequate drainage may increase the effective depth to a limited extent. No method of handling will remove a claypan, sand or gravel layers or bed rock. Only the choice of crops that are adapted to the available soil depth will help in ameliorating this problem.

Assuming that the importance of the physical properties has been correctly appraised and that these properties are favorable, then three chemical properties may be given a proper consideration. Soil reaction is important to crop production. Soils are either acid, neutral or alkaline. Slight acidity or slight alkalinity are not harmful, but extremes of either may eliminate many crops or limit their yields to an unprofitably low level. Acidity is relatively easy to correct by the use of some form of lime. Alkalinity, if severe enough to be called alkali, is more difficult to

correct. Use of manure, sulphur and gypsum with good drainage and enough water to wash out the alkali salts, may gradually improve the situation. For the major portion of farm and garden crops, soils that are near neutral are favorable.

A reserve supply of plant nutrients is important for sustained high production. Plants require nearly a dozen nutrient elements which come from the soil, any one of which, under some conditions, may be in limited supply. The most nearly universal deficiency is probably nitrogen and humus which supplies nitrogen. Both phosphorus and sulphur are often inadequate. The supply of potassium is low in peats and sands. Calcium is lacking in very acid soil. Other elements may be limited in certain areas.

Total reserve of nutrients may determine the durability of the soil's productivity, but solubility and availability may be much more important to immediate yields. Nearly any soil probably has enough of all essential elements for several good crops if the plants could obtain them. The availability of nutrients may be influenced by many factors. Soils that are acid and high in soluble iron and aluminum, are likely to show low phosphorus availability. But soils that are excessively high in lime may also be low in available phosphorus, and other nutrients such as zinc, copper, manganese, boron, and sometimes iron. Availability is usually improved by increasing the supply of organic matter, and by keeping the soil as nearly neutral in reaction as practical.

The ultimate crop yield, therefore, will be much influenced by management practices and improvement methods. Good management will have a lot to do with soil moisture control. A good soil must be able to eliminate its surplus water and at the same time to provide available moisture to the growing plant. The irrigator who can apply water frequently, but in moderate amounts, has the best possibilities for moisture control. Any grower may use methods to conserve and advantageously utilize the moisture supplied by the natural rainfall. Management to avoid surface runoff and to prevent erosion is essential. Thinner planting when moisture is limited gives a bigger harvest. Adequate fertility—neither too much nor too little available nitrogen—makes a limited supply of moisture go farther.

No system of management is likely to be good if it fails to provide for humus renewal. The humus is the most active portion of the entire soil, though it amounts to only a few per cent or sometimes only a fraction of 1 per cent. The humus carries all

the nitrogen and a large portion of the sulphur and phosphorus, as well as some of all the other essential nutrients. As the humus rots, soil structure is improved and nutrients are liberated to feed the crop. Active humus—that which is rotting—has most influence on crop yields.

There are few soils that do not require the natural supply of available nutrients to be supplemented by the use of commercial fertilizers. In some parts of the western country it is necessary to provide nitrogen, phosphorous, potassium, sulphur, calcium, zinc, manganese, or boron, and possibly other elements before maximum yields could be obtained. Some of the nutrients are best supplied as applications to the soil as has long been the practice in the use of fertilizers. Others such as zinc and manganese may be best sprayed on the foliage in the form of a soluble salt such as zinc sulphate. Yields cannot go beyond the supply of the most deficient element. For the best yields, from three to half a dozen elements may require supplementing because of the low availability of the natural supply held in the soil.

Finally, good management requires the practice of methods of conservation to save the soil from erosion and to protect the nutrients against leaching. This is done by wisely adjusted crop rotations, the use of cover crops, and sometimes perhaps by devoting certain lands almost entirely to grass or timber. The best lands will not remain good in the absence of conservation methods. In the bare fields every sizable rain takes a portion of the good soil and an even larger portion of the soluble nutrients. It is the part that is easily lost, which gives maximum production to our cultivated fields if it can be saved.

Preventing Poultry Diseases

Condensed from Everybody's Poultry Magazine

G. T. Klein

PERHAPS more poultry raisers have been forced out of business by disease than by low prices for their products. If disease is such a factor in success, why is it that some growers have been able to hold losses to a minimum while others operating under similar conditions have failed? Last year, Massachusetts had the lowest poultry death loss of all states, according to the U. S. Bureau of Agricultural Economics.

Worms, for example, are not a serious problem in New England. It may be that good ranges, particularly good sod, have given protection. It is true that on individual farms worms are a problem, but usually, it seems, the worm trouble is associated with bare-ground brooding. Certainly it is not absoluately necessary to rotate the range each year, though admittedly that is usually helpful.

There are very practical questions that come up in connection with range management. When range is used more than one year, should shelters be moved? What is the best type of shade, assuming shade is an essential. These very definitely have a relationship to disease control.

The bare spots on a range seem dangerous. It looks useless to move the shelters if the same range is to be used. It might be far better to keep the shelters in the same place, holding the base area as small as possible because moving is sure to cause a new bare area.

The question of shade is a debatable one, but I favor it, and prefer artificial shade to crops. The same considerations enter into this preference. The best protection from worms seems to be sod, and you cannot have sod and growing crops that are rank enough to give shade on the same land. Crops do not give shade in time to be of benefit to early-hatched birds in New England. They are ready for housing before the crops have made enough growth to give shade. Artificial shade is ready when and where needed. It has many advantages.

Respiratory diseases give us considerable concern. Bronchitis is most serious in New England. It is a virus infection which commonly strikes in the fall and win-

Reprinted by permission from Everybody's Poultry Magazine, Hanover, Pa., April, 1945

ter and causes an extreme drop in production and serious after-effects on shell texture and hatchability. This same disease causes heavy losses in young chicks.

What makes this disease so serious is that birds once having it remain carriers and spreaders indefinitely. Once introduced into a concentrated poultry area, it is likely to be a continuous problem.

Dr. Henry Van Roekel of the Department of Veterinary Science, Massachusetts State College, has worked out an immunizing program to combat it. Growing pullets are innoculated with the infection on the range when 8 to 16 weeks of age. They are not severely affected, and our experience is that they get a lasting immunity. These pullets are innoculated in the trachea with the live virus produced in the laboratory. Only a half dozen birds in every fourth or fifth shelter need be given it. They will spread it over the range in about four days.

It seems evident to me that live birds that have had disease are a far greater source of disease spread to newly-housed pullets than litter or houses. Except in cases of outbreaks of cholera or other bacterial diseases that would live over in litter or houses, the yearly cleaning of houses does not seem necessary.

It is a growing practice to clean laying houses in April or May, keeping the litter in the house throughout the summer and for the new flock of pullets housed in the fall. In fact, these new pullets use this litter the next winter. This is a step taken to insure dry litter, and it does the trick. We may run into some problem that will cause a change, but now it looks good as a labor saver and, personally, I would rather have the dry, year-old litter, even though it is filled with dry manure, than the wet sloppy mess that is so common in northern localities.

Cornell University poultry department has shown that the paralysis complex is easily spread from hens to chicks during the first month of brooding. That is a practical precaution to observe. Reduce your traffic between hen coops and chicks.

While we have good success with brooder-layer houses in Massachusetts, chicks and hens seldom use the building at the same time. Here again it seems as though the live bird is the important source of trouble. A nationwide program of keeping layers for only one year would certainly be a fine disease control measure.

It is always hard to prove how diseases are carried to farms. The suspicion points pretty strongly to the live poultry dealer. Going from farm to farm, he has a good

chance of carrying in infection in his poultry crates and on his clothing. The buyer is a necessary part of the poultry operations, but it is better to establish a boundary beyond which no one can pass and, in the case of the poultry buyer, to transport the birds to his truck which is stopped some distance from the poultry buildings.

It has never seemed like a sound policy to me to buy started chicks, pullets or breeding stock where they must be brought on a farm with other stock. Day-old chicks and hatching eggs are far safer.

It just isn't safe to return birds from an egg laying contest or a poultry show. They can be held in quarantine for a period, but even after they are bloodtested for pullorum disease, there is still considerable danger that they may be harboring bacteria or a virus that will cause trouble.

Disinfecting poultry houses is a question that puzzles me. I'm sure treatment for mites with one of the carbolineums or similar materials is necessary once a year. This ought to be done fully a month before chicks go in the brooder house, because strong disinfectants can cause burning of the chicks unless chemical changes have a chance to take place. In cold weather, these are slower than in warm weather.

Pullorum disease still commands attention of the industry. After 30 years of bloodtesting, we continue to spend thousands of dollars a year to test and control the disease. Most of the 800 flocks tested each year in Massachusetts are Pullorum Clean, but there are a few breaks each year which require retesting. All the time our disease men are running experiments to determine if there are short cuts that are just as good as the tube method which has to be used in the laboratory. So far, we haven't found it.

And coccidiosis remains a head-liner on the disease list. Dry, deep litter is an effective control but is not absolute. It will pay to watch developments on use of sulphur and sulfa-guanidine. Sulphur or sulphur-urea products in the mash period at a time is a preventive and sulfaguanidine at a rate of ½ per cent in the mash for a couple of days when first signs appear may give us just what we are looking for.

Six Points for Disease Control

1. Establish a good sod for range brooding.
2. Get on a pullorum-clean chick program.
3. Use deep dry litter for brooding, but don't overlook the possibilities of sulphur and sulfa drugs.
4. Enforce a quarantine
5. Carry over no hens except for breeders.

"Vacuum Cleaning" Clover Seed

Condensed from The Michigan Farmer

Wilowell Treaster

SEED of the ladino and white clovers is high priced and scarce. This is true mainly because no successful means of harvesting these short clovers, as well as other forage and grass seeds, has so far been devised.

But the answer to the problem may have been found as the result of experiments conducted during recent months by the agricultural engineering and farm crops departments at Michigan State College.

If further tests bear this out, the sight-seeing motorists some day may see oversize vacuum sweepers grinding their way across clover fields. The machine assembled at the college operates on the vacuum principle, and somewhat resembles an ordinary household vacuum cleaner without the handle.

In the harvesting process a mower is first used to clip off the heads and leaves, and the clover is allowed to dry for a few hours in the swath. Then the vacuum harvester is put into operation to suck up the clover heads and deposit them in a large inflated sack carried on a trailer.

The mechanism is mounted on an ordinary 2-plow, all-purpose tractor. It consists of a blower, which provides the air suction, and a gathering unit which houses a rotating beater. The blower, of the grain elevator type, is operated by the belt pulley on the tractor, while the gathering unit beater is turned by wheels running on the ground.

The vacuum type harvester seems adapted to any of the short seed crops that can't be reached satisfactorily with an ordinary combine. Approximately 150 pounds of ladino seed to the acre were secured in harvesting tests on the college farm last summer. This is double the amount that can usually be picked up with the combine, since much of the clover is ordinarily left on the ground.

With seed generally selling for as much as $2 a pound, the possibilities of profit for the farmer aren't difficult to imagine. Easier harvesting, of course, eventually would reduce the price of clover, and benefit agriculture in general by providing a larger supply at a lower cost. Greater acreages of clover are advocated for high grade pasture.

Reprinted by permission from The Michigan Farmer, Detroit, Michigan, March 17, 1945

Perfection of this harvester is expected to have widespread significance, not only in Michigan but in all eastern states where ladino, white and red clovers are raised.

College specialists are not sure that the average farmer can build one of these machines himself, but it is possible that he could have the necessary parts made in a well-equipped shop.

Keep Them Burping

Condensed from The Jersey Bulletin

Jack Baily
New York

Do you know that a cow would die in two or three hours after feeding if she could not burp? Do you know that bloat is not caused by excessive gas formation in the cow's stomach? Do you know that alfalfa pasture produces less gas than alfalfa hay and concentrates?

These statements have been proven to be true by research workers at the University of California Experiment Station. Their results were verified, in turn, by a committee on Animal Health acting in the interests of the National Research Council. As their findings are at variance with commonly accepted beliefs, they are worthy of review.

Bloat is commonest under two conditions. It is probably most frequent in herds on succulent young legume pasture, though rape, cabbage leaves, and other green feeds may also cause its appearance. The other common occurrence of bloat is in herds where concentrates form the greater part of the ration.

Gas formation from all types of feed is a perfectly normal process in the rumen of the dairy cow. It is caused by the fermentation of the feed and subsequent bacterial action. The old belief was that some feeds fermented more than others, green alfalfa in particular being highly fermentable. Bloating was held to be caused by this extra amount of gas. It was believed that the cow was able to eliminate gas only at a certain rate; if it formed faster than it could be eliminated, bloat was a result. The California workers soon found that this theory was faulty.

In the first place, a ration of alfalfa hay and concentrates was discovered to form more gas than one of green alfalfa. Yet the hay-fed animals seldom bloated,

Reprinted from The Jersey Bulletin, Indianapolis, Indiana, March 5, 1945

while the pastured animals were regularly affected. A study of the gases found in the stomachs of the animals in the two groups showed approximation. The gases were of the same kinds,chiefly carbon dioxide and methane; and they were present in about the same proportions, in all stomachs at equal intervals after feeding. Then why did bloat occur in the animals where the least gas was produced in the stomach?

As another puzzler, there was the matter of cows pastured on grass. These animals ate as much grass as they did later of alfalfa, yet they were never affected with bloat. Why? The grasses were as green and succulent as the alfalfa.

A review of ruminant physiology indicated a possible solution. It had long been known that belching was a reflex act in the cow, and not subject to voluntary control as in man. Furthermore, it had been demonstrated as being brought about by tickling or scratching the lining of the rumen near the cardia, the name given to the opening of the esophagus into the stomach. Following stimulation of the gastric wall, the cardia relaxed at the peak of the next contraction of the rumen, and a quantity of gas was allowed to escape.

The investigators added two and two and got four. Hay contained a great deal of fiber; succulent legumes and concentrates contained little. The nature of the grasses was such that sharper, more irritating surfaces were present. If there was nothing in the feed to induce the belching reflex, gas would accumulate to cause bloat.

Preliminary work indicated that they were on the right track. However, it was shown that the cardia always relaxed when the pressure was highest, caused by the contraction of the rumen. No matter when the stomach wall was stimulated, the cardia failed to relax until the next contraction of the rumen increased the gastric pressure. Why did not belching occur when the accumulated gases reached an equivalent pressure?

It was soon shown that pressure alone had nothing to do with belching. When fiber was lacking in the feed, there was no belching. With fibrous feeds in the rumen, gases were introduced in greater amounts and at higher pressures than a normal animal could ever produce. Yet the gases were promptly eliminated by rapid belching and the animals were soon at ease. The logical assumption was that the reflex opening of the cardia was the most important part of the belching act, and that it was caused by the stimulation of the gastric wall by fiber in the feed.

This theory was experimental-

ly checked. Finely ground wood pulp, a non-irritating fiber, was mixed with concentrates and shown incapable of preventing bloat. Field reports indicated that fine grinding of alfalfa hay also produced frequent bloating. This would be expected, as the grinding would tend to destroy the prickly nature of the fiber.

It was further shown that gases formed fastest immediately after eating. Quite naturally, the amount of gas and the rapidity with which it formed was shown to depend on the amount of food consumed. This would account for the preponderance of bloating in hungry or greedy animals. The animals that "break into" the alfalfa field to bloat are probably hungry in the first place, or they would stay on their own side of the fence.

To the general run of cows must be added the so-called "chronic bloater," the animal that bloats on any and all kinds of feed. Such cows are examples of gastric insensibility to the stimulation of the belching reflex. The time will probably never come when she is not troublesome, and the best cure for such an animal is usually found at the nearest stockyards.

Personal observation will serve to verify the conclusions drawn. Most dairymen, at some time or other, have had a cow choked on feed. Remember how quickly she started to bloat? Surely this was nothing more than a prevention of belching through closing of the esophagus.

There are few of us who do not know how rapidly a cow bloats if she is turned on her back. The cause is primarily the same; the liquid in the stomach covers the cardia and the gases cannot escape when belching occurs. A further observation may be made in the case of the rapidly bloating dead cow. The belching reflex stops with death, but the fermentation of food continues for a time.

Practically speaking, the work of the Californians is of great value to dairymen who pasture legumes and other succulent feeds. The first point to consider is the supplying of proper amounts of fiber in the ration. This may be done in a number of ways.

The practice that allows the most freedom of pasturage is probably the one that calls for 50 per cent grass seeding with the legume.

If land values, size of the herd, and other factors prohibit part seeding with grasses, in the case of alfalfa, at least, hold cows off pasture until the bloom stage is reached. At this stage, the alfalfa is much more fibrous, and the danger of bloat is consequently lessened.

If such a plan is economically impractical, then the feeding of

some good fibrous hay before turning to pasture is recommended. The hay will have to be of good quality or the cows will probably fail to eat enough of it to do any good. Sudan hay has been found to be especially good, and alfalfa hay of slightly lesser value. Feeding of hay with good pasture may seem extravagant, but in the fall of the year it may be impossible to make use of excellent legume pastures unless some such system is followed.

In closing, a summary may be offered for the control of bloat in dairy cattle.

1. Never let cows go into a pasture while they are hungry. Keep them filled up—the less they eat at a time, the less gas is formed in their stomachs.

2. Don't pasture alfalfa before the bloom stage.

3. If you must pasture it sooner, feed hay liberally before each turning into the pasture.

4. Furnish plenty of water, salt and essential minerals to the herd at all times.

5. In case of trouble, call a veterinarian. Keep the affected cows on their feet and moving, if possible, until he arrives. As a last resort, trocarizing may be resorted to. Insertion of the trocar should be made at a point half way between the last rib and the point of the hip, and a couple of inches from the edge of the lumbar vertebrae.

6. Keep 'em burping!

New Sorghum

A new high-yielding sorghum with the lowest prussic acid content of any known variety has just been announced by the South Dakota Experiment Station. Named Rancher, the new crop is both a good forage and grain producer. In tests it has produced from a ton to a ton and a half more forage per acre than standard commercial ambers, and from 10 to 15 bushels more grain.

Because of its early maturing (90 to 100 days) and its ability to thrive in a wide variety of soils, Rancher may be what the doctor ordered for regions of the Great Plains where rainfall is too short for a dependable corn crop. Many stockmen, aware of the large amount of feed sorghum produces, have steered clear of the crop because of the death-dealing prussic acid.

Rancher was developed by C. J. Franzke, South Dakota plant breeder—one of the first to discover that the prussic acid content of sorghums can be reduced by selection and breeding. Seed is tight this spring—there'll be more in 1946.

—*Farm Journal*

Few Bulls Become Great Sires

Condensed from The Shorthorn World

Dr. Carl W. Gay
Ohio State University

It is a matter of common observation that the majority of bulls do not prove out as sires of any great importance. This fact probably is responsible for more failures in breeding enterprises than any other one item. On the other hand, the possession of a great breeding bull is the most important factor contributing to the success of a breeding operation.

A sharp distinction should be drawn between breeding livestock and propagating livestock. The former is characterized by qualitative improvement while propagation implies only an increase in numbers. The breeder is a builder—his efforts are constructive. Unless matings are made in the hope that the calf will be better than the average, its breeder should not be entitled to recognition as such but should be classed as a propagator, and a sire that does not accomplish improvement in his get is not a successful sire, no matter how many calves he may have.

Some breeders just stumble into success by acquiring, one might say almost accidentally, a bull that proves himself to be a great sire. He establishes his owner as a successful breeder, and makes a great reputation for the herd in which he is used. But the fact that this owner's star which has been ascending during the old bull's life, begins to wane when the old bull passes, and has to be replaced, shows the extent to which the standing of this herd depended upon the bull's capacity as a sire, rather than upon the skill of the breeder.

Eminently successful breeders owe as much to their herd sires as did the breeder just described, but they can be credited with the selection of the bull to which their initial success was due, and they are able to maintain a constructive breeding program by continuing to select bulls that become great sires in their hands. There is an uncanny knack or skill in picking sires possessed by these breeders. They seldom experience disappointment in the breeding ability of untried sires they have chosen. One may be heard to say—"He may not be a

Reprinted by permission from The Shorthorn World, Aurora, N. Y., March 10, 1945

show bull but he looks to me like a breeding bull." Yet they may not be able to describe to anyone else what it is that leads them to this conclusion. Probably it is intuition, a rare and valuable natural gift. These breeders always seem able to recognize the minority bulls in that upper level of merit upon which the breed depends for its improvement.

That but few males actually become noteworthy sires is well known to the successful breeder, but in addition, specific evidence of this fact is furnished by special studies of the transmitting abilities of sires in the different classes of livestock. Years ago the late Dean Eugene Davenport of the University of Illinois worked with the stud books of the American Trotter. He found that 3% (207) of the stallions registered (34,299) were responsible for from 66⅔% to 75% of the speed of the breed. Some years after, the late Dean Herbert Mumford, Dean Davenport's successor at the University of Illinois and a prominent breeder of Duroc Jersey hogs, charted the lines of inheritance of the one hundred leading sires of the breed, at that time, based upon the winnings of their get, and found them all to be descended from eleven boars. Similar analytical studies made by Donald F. Malin (The Evolution of the Breeds) of Shorthorn, Hereford and Angus cattle, also Duroc Jersey and Poland China hogs, reveal that each breed was dominated by the influence of a small but select group of sires. Lt. James R. Douglas, recently on the staff of The Shorthorn World, checked with a similar analysis of the beef breds.

There are a variety of reasons why so small a proportion of bulls born prove their worth. In the following discussion it is assumed that the bulls are potent. This of itself is the reason some bulls fail. Any of the following reasons may account for a bull's failure as an improver even though potent.

1. They were selected on show form alone, rather than with progeny and pedigree included. All animals carry genetic determiners for two sorts of characters—those that show in the animal's physical make-up and are therefore designated as dominant, and others that are not manifested or displayed in the present generation but whose determiners carry on in the germ plasm to show up, possibly, in the next or any succeeding generation. Show animals win on their dominant characters (phenotype) but they breed from the germ plasm made up of the determiners for both dominant and recessive characters (genotype). In other words, they transmit what they have inherited, and there

may be many characters represented in their inheritance that do not show in them. It is clear then, that if a bull chances to have inherited, as dominant characters visible in his make-up the cream, of his ancestral characters, he is not an average sample but far above the average of his family. He may win on the good features that make up his exterior but he will be a disappointment as a breeder. The average of his ancestors determines the average of his progeny and this average is inferior to him as he is seen in the show-ring. On the other hand, a winner may not be the result of a chance assortment of all the good that is in his family, but he may be a fair average sample, his immediate parents and other close ancestors also having been winners. Even though he breeds the average of his close-up ancestors, they are uniformly good. Their average is high, and the bull will be a good sire, as well as a show bull.

There is definite correlation between form and function in meat animals. Fat cattle of approved form and finish yield most in carcass, while feeder cattle of the correct type will utilize feed more efficiently. But individual excellence is of less importance in forecasting the breeding value of a sire or dam, because the reproductive and hereditary functions are not correlated so closely with a definite form as production is. Individual excellence is an expression of the phenotype (dominant characters) which has nothing to do with hereditary transmission, that being determined by the genotype (all that has been inherited including both dominant and recessive characters). It is possible for a superior bull to sire ordinary calves or for an ordinary bull, as show standards go, if well bred, to sire superior calves. In the majority of instances, however, a superior individual may be accepted as a fair sample of his parents' transmitting ability, and what he has inherited he should in turn transmit. To this extent, individual merit is an aid in distinguishing the superior breeder, and most cattlemen so regard it. However, the progeny test or the pedigree (record of ancestry) or both if possible, are of even greater value for this purpose.

2. Fitting may have a lot to do with the show rating of a beast. A rather plain individual, superbly fitted, may beat a better bull that has not had the advantage of such skillful conditioning. Condition is the result of environment—the system of management to which the bull has been subjected—and the effects of the environment are not inherited. Hence, this show bull will be a disappointment as a breeder.

3. They are not prepotent for

the desired character or characters that constitute improvement. Prepotency or the ability of one parent to determine the character of his or her progeny is the result of being pure as possible for the determiners of dominant characters. This in turn comes from a long line of improved, pure breeding with careful selection. The first bull described above as being a winner by virtue of the fact that he, by chance, had inherited the good things of his ancestors, the average of which was not high, could hardly be expected to prove a prepotent sire. The other bull cited, the one that was backed up by winners in his immediate ancestors, should be prepotent and breed on as good as he himself is.

4. They are not breeders of breeders. Quoting Dean Davenport in his Principles of Breeding: "Individuals of the same ancestry differ in their breeding powers. Some can produce excellence directly in their own descendants, and others indirectly through sires and dams they are able to get. The line of descent runs only through the few that can produce breeders of breeders, not simply performers.

"All studies yet made show that, on the average, performers (those individuals possessing high individual merit) are better breeders than non-performers; that is, than those which do not show in their personal development a high degree of excellence, though, there are numerous exceptions, largely arising from our inability accurately to judge individuals by external appearances."

5. They are influenced by regression or the drag of the race. As stated before, there is a tendency for the progeny or the calf crop to average about the same as the average of their ancestors. It will be seen then that the calves of an outstanding bull that is well above the average of his ancestors quite likely will average lower than their sire, as a result of the average of the ancestors dragging to a lower level of excellence or causing them to regress. On the other hand, the great bull which has not shown so much advance over his ancestors as the one just described because this one has a higher average of excellence among the immediate members of his family, will not be affected by the drag. To the bull that is himself below the average of merit in his family, the influence of the ancestry may be in the nature of a boost making him a better breeder than he is an individual.

6. They fail to nick with the females with which they are mated. This is important even though some geneticists are given to belittle the nick. Not so the practical breeder. The Cruick-

shank herd of Scotch Shorthorns was founded on a Champion of England—Lord Raglan combination — Champion of England bred to daughters of Lord Raglan and his sons to the granddaughters, etc. They nicked. Then there is the Browndale Pilot—Browndale Star nick featured in the Dorsey Jones herd. The want of nicking may impair seriously the breeding ability of a sire. With other females he might do well.

7. They are bred to inferior females. Any breeder interested in building up a sire will see to it that his influence for improvement is not offset by mating with females of low breeding value. The importance of the class of females to which a male is bred is forcibly shown, if an example in horse breeding may be used, by the fact, as proven by the records, that a stallion will actually sire much faster colts after having won distinction as a race horse. Not that developing his speed of racing has influenced his ability as a sire but because, after proving himself as a race horse, he is mated only to a select lot of brood mares. As an obscure stallion he stood at a low fee and served farm-run mares. After a successful racing career, he commands a service fee so high that no mare owner will hazard such an investment unless he has a proven mare or one in which he has the utmost confidence as a producer. The same may be said of the outstanding show bull.

8. They are low in breeding efficiency as a result of mismanagement. This will not have any effect upon what calves he sires if they came to maturity but it may seriously impair his capacity to get cows in calf, thereby curtailing the number of his get upon which his rating as a breeder depends.

There are many notable examples to prove that females, too, may fail as great breeding cows for these same reasons. On the contrary, many good herds are descended pretty much from one old grandmother cow. In this connection it should be noted that Shorthorn and Angus families bear the names of cows, not bulls. The importance of the contribution of a great breeding cow to a private herd or to the breed is not to be under estimated, but because she can have but one calf while the bull may sire fifty, she is of less relative importance as a source of improvement.

We do not yet have all the answers to the question—"Why do so many bulls fail to prove good breeders?" But those discussed are sufficient to account for a fair share of the failures.

Rodeo . . . A Little of Its History

Condensed from Hoofs and Horns

W. M. Sheldon

RODEO! Thrilling, spectacular! Western America's distinctive contribution to the spectacle of sports. RODEO! Tough, hard, exacting. Demanding split-second dexterity upon the part of its performer, and a courage that will take the short end of odds ten-to-one, and go in and battle it out in a swirl of rearing, fighting, plunging fury, unleashed by a catapulting, unconquered bronc, or will risk the charge of an infuriated Brahma bull which has the heart to meet and vanquish a Bengal tiger in a straight-away fight.

RODEO! A sport which is advancing so rapidly in public appeal that it may well outrank all others within the next few years. A sport that has spread far beyond the confines of its sectional origin, and is today a major drawing card in all the metropolitan centers from coast to coast.

The sport is a fitting exemplification of the character and pursuits of the hardy people in the sections where it originated.

The proving grounds for the ultimate contestant in Rodeo were not laid in the smooth, well clipped fairways of parks as in the case of golf, nor on the leveled, sprinkled surfaces of the diamond or gridiron as for baseball and football. They were, on the contrary, often laid in regions of the most formidable and forbidding terrain where sharp, upthrust rocks, jagged peaks, or sheer, abysmal gashes in the earth's surface conspired against man's efforts to do his work. Streams to ford or swim and brushy ravines in which cattle may hide away from their pursuers all made obstacles which had to be overcome by ingenuity and hardihood.

Here, among these surroundings the cattleman and his staff of cowboys undertook the care and raising of the herds of cattle that were to provide beef for the tables of the nation. Each animal represented a potential value which could be realized only when it was delivered to the shipping pens at the railroads. It represented three or four years of care, feeding, and labor during the period of its development. The animal had to be branded to afford identification and proof of ownership. Wounds sustained by the animals in fights and accidents on the range had to be

Reprinted by permission from Hoofs and Horns, Tucson, Arizona, March, 1945

treated against infection. Screw worms, grubs, and ticks all had to be combatted, herds had to be gathered to "cut out" the animals ready for market. Practices of later years added dehorning as one of the further tasks imposed in the care and raising of herds.

Many of the animals of the range do not take kindly to the direction of man. They are semi-wild, coming into contact with man at infrequent intervals, and upon these occasions their experiences are likely to be painful and the remembrance of them unpleasant. The calf's catalog of grievances begins with being roped from his mother's side, dragged to the branding fire and feeling the searing application of the branding iron. Next he may be roped, thrown, and subjected to the biting sting of creosote or antiseptic applied to wound or infection. The male calves are later castrated, and in the second year of their lives are brought to the dehorning chute.

All of these experiences tend to make the animal wary of contact with man and he will bolt for a mesquite thicket, cactus patch, or any other protective refuge that will promise refuge from his pursuers.

For the roper to catch him, the most expert handling of the rope is required. At times conditions are such that the rider cannot use his rope and must ride alongside and throw himself from the saddle and catch the running animal by his horns and wrestle or "bulldog" him to the ground and tie his legs in order to apply such treatment as may be necessary.

The foregoing are some of the ordinary routine duties which the cowboy discharges month in, month out, under blistering sun or in the numbing cold of winter months on the higher ranges. Self reliance, courage, and dogged determination are required for one following this occupation, and proficiency in this field is its own highest testimonial of the quality of the individual.

Fall and spring roundups bring days of excitement and compensation for the lonely hours of riding the ranges. Then the hands from one or several of neighboring ranches gather and cut out stock for their owners, unbranded animals are branded, and conditioned stock is started to the shipping points.

The chuck wagons send out their savory and inviting odors, the hands of the various ranches gather, and inevitable discussions arise. Boasts are made, and opinions are divided as to who can most quickly rope and tie a steer, bulldog an animal, or stay longest on the back of some rearing, sunfishing bronc.

Amidst such settings, years ago, RODEO was born. Around the camp fires of countless

ranches the season's wages of many a waddy have been bet to back up his belief in his own ability or that of some other member of his ranch crew.

The local reputations gained at one and another of these impromptu rodeos, spread to far distances over the vast range lands of the West, and here and there other local champions felt the desire to challenge and meet and test the ability of those boys who were rated "good" in their own sections.

Enterprising cities such as Pecas, Prescott, Denver, Pendle, and Cheyenne early realized the immense interest that would be aroused through staging "Round-up" or "Frontier Days" exhibitions where these local champions from every part of the West could come together and match skill with skill to determine who was qualified to rate as a "higher up" Champ in any one of the several operations.

The interest in the performances at these early exhibitions far exceeded the most enthusiastic anticipations of the original promoters. While nearly every state in the entire West contributed its quota of entrants who were rearing to compete, and onlookers with the "savvy" to appraise and evaluate the fine technical points of the performances, there were also numerous observers from more remote towns and cities who were not familiar with range practices but who found the performance thrilling and exciting.

Saddle Bronc Riding

Here these visitors, instead of witnessing a rider coming out on a well reined and carefully schooled animal of the horse show type, saw a chute gate open, a plunging cannonade of fury breaking through with the rider raking him from neck to flank with his rowels, with one hand held high and forbidden to touch the horse or any part of the gear in maintaining his seat and balance. The other hand grasping, not a bridle rein, but merely a one-inch rope attached to the unbitted halter on the horse—a plunging, sunfishing, side-wheeling kicking concentration of fury—whose one aim was to be rid of the constricting gear and the hated rider on his back.

The rider had to keep his seat for ten seconds to qualify for the required competitive ride. Frequently some of them were unable to "get with" their horse and stay on a seat that was exploding from all directions at once. The force of their "bucking off" might shatter a collar bone, break an arm or leg, or bash in a head in hitting the hard arena.

But even as one hapless contestant might be picking himself up or was being helped off the field, another chute gate would

fly open and still another rider, undismayed by the experience of the former one, would come tearing forth, and would be away on his ride.

Bareback Bronc Riding

The bareback bronc riding event presents even more difficulties to the rider than the saddle bronc event. Here he does not have the saddle to steady him but must maintain his seat on the smooth back of the kicking, plunging horse while raking with his rowels in the same manner as in the previous event. He is required to ride for only eight seconds, but this by no means ends his problems. Dismounting from the back of a rearing, twisting bronc without the help of a saddle horn is about like leaving a fast freight from the side door of a box car.

Wild Horse Race

The wild horse race can present more hazards than a stampede in a theater fire. Not only must the horse be saddled in the open arena with only one man to hold him as he rears and whirls away from the saddle, but he is as likely to head for the corral fence or try to hurdle one of the other horses as he is to take a straightaway course in the race, and any rider who comes through it can rightly wonder whether or not he has just been spilled out of a barrel churn.

Bull Riding

The bull riding event, while no demonstration of any part of ranch work, has become, since the introduction of the Brahma bull, one of the most dangerous and exciting events of the arena. These Brahmas are vicious beasts, and for their weight, the fastest animal upon legs. They don't realize that the contest is over when they have thrown their rider (if they do) but are more than disposed to turn upon him while he is prostrate and either gore or trample him into the earth. Many a contestant in this event will limp for the rest of his life as a souvenir of the few brief seconds that he competed.

The Clowns

At this point let us give tribute to the clown who has been amusing the crowd with his antics during the intervals between the various events. Part of his job during the bull riding event is to distract the attention of the infuriated animal from the fallen victim. He does this at the risk of his own safety and very life, and many a contestant is performing in events today who would not be here if it had not been for the timely intervention of one of these courageous clowns.

Calf Roping

The series of exhibitions moves on to the calf roping contest.

From the starting chute the running calf is started down the straight-away course to cross a given line before the roper is given the signal to start in pursuit. Here the superb quality of the Western Quarter Horse is really demonstrated. From a standing start he will, within a length or two, be under full speed in pursuit of the running calf. The performance of overtaking, roping, dismounting and tying the calf "against time" is where quick starting, gathering speed, and stopping can save precious seconds that may lead the contestant to the pay window. With uncanny precision and skill the rider swings his rope, the loop falls over the calf's head, and he is jerked to a sudden stop. The horse, intelligent and wise in the part of co-operation required of him, comes to a sliding halt and backs away, keeping the rope taut event as the rider leaps from the saddle and races to the calf to throw him and tie three of his legs tightly together. If the tie is not secure and the calf gets on its feet, then it is "no time" for the roper."

Team Tying

The team tying contest demonstrates the varied skill of the ropers, where one man of the team ropes the head of the full grown steer and his partner snares the heels with a ground loop after the animal has been brought to a stop. The two horses move apart and the steer is stretched on the ground. This procedure is frequently used on the range for the purpose of treating wounds or sores.

Bulldogging

In this event a full grown steer leaves the chutes and is started down the field. As he crosses the "starting line" the bulldogger and his "hazer" urge their horses after him full tilt. Here, again, the extraordinary qualifications of the Quarter Horse are brought into play. The hazer rides on one side of the steer to keep him running in a straight line while the bulldogger rides on the other side. As the latter's horse comes alongside the steer, the rider leaps from his saddle, catches the animal by the horns, and by sheer weight and by digging his heels into the ground, brings the steer to a stop, then wrestles him down.

No other Rodeo event requires more cool courage, balance, and perfect timing, and many a contestant bears evidence of falling short in one or another of these qualifications by sustaining severe injuries in this daring performance.

Single Roping

In single roping, one man alone ropes and ties a full grown steer. The start is the same as in calf roping and team tying, but

thereafter the technique differs. A man cannot throw a steer by hand as he does a calf before tying the legs, so the animal is usually "tripped." This is done by throwing the rope behind the steer's hind legs after the head is caught, then riding off somewhat at an angle ahead of him, thereby drawing the rope tightly behind his legs and tripping him. The roper dismounts and runs and ties the animal's two hind legs before he can get up, the horse in the meanwhile holding the rope tight.

This is a very difficult type of roping, and not as many contestants are proficient in it as in calf roping and team tying. The horse has to be strong and quick and specially trained, and the gear must be heavy to withstand the strain of the greater weight of the animal.

It was inevitable that the performances in these early day Rodeos should provide the visiting Easterner and Midwesterner with amazing tales to relate to his friends upon his return home. A newly aroused interest in the West began to be felt. The fame of the sport spread throughout the land and increasing numbers of Rodeos had to be held to satisfy the appetites for thrills.

But the sport lacked centralized control. Each Rodeo was held as an individual performance regulated by rules of the local committee. There was no assurance beyond the word of the local committee that the prize money would be paid the winning contestants.

In 1929 the Rodeo Association of America was formed to standardize the rules of contest and the conditions under which the contests were to be held, also to guarantee the prize money to the winners.

The system of awarding one "point" for every dollar of prize money won was also instituted so that at the season's close the top scorer or champion in each event could be determined, as well as the all-around champion who had won the greatest number of points in all the events.

But there were still some details on which the promoters and the contestants did not see eye to eye, so in 1936 the Cowboys' Turtle Association was organized to further protect the interests of the contestants and to insure honest co-operation on their part with the promoters.

Through these two organizations Rodeo became established upon the sound foundation which is carrying it forward toward its expanding and promising future.

There is no comparable record from the days of the Gladiatorial combats, down through the Olympic games that gives evidence of greater hazards faced, more disabilities suffered, finer

pluck, grit and endurance exhibited than is continuously shown by these Rodeo contestants.

As the sport has grown in popularity, so has grown the search for tougher and saltier stock for the bucking events. When a horse has shown all the top hands on any spread that he "can't be rode" he will command a top price from any one of several stock contract men who furnish stock for the various shows. Names of such horses as Midnight, Badger Mountain, Five Minutes to Midnight, Home Brew, Scene Shifter, Conclusion, and the incomparable Hell's Angel have become legendary throughout the circuits.

RODEO! A sport where the ugly term of "quitter" has never cast its yellow tint of blight. A sport where "good sportsmanship" is so infallibly in order that seldom a penalty is imposed for a wilful infraction of the rules of the game.

RODEO! The spirit of America's most glorious and imperishable frontiers!

"Synthetic" Capons

The Oklahoma Experiment Station has succeeded in turning cockerels and old cocks into high-quality, fully fattened market chickens with a bleached-out milk-fed appearance by the addition of an estrogen (female sex hormone) into the broiler or fattening ration. Only hitch in the proceedings is that the most potent estrogen tried, dianisylhexene, is not yet available for commercial use.

Some 1,200 chickens, ranging from eight-week-old fryers to two-year-old cocks were used in the fattening trials. The estrogens tested were dissolved in warm soybean oil and the oil solution then thoroughly mixed in the ration.

At a probable cost of 1 to 1½ cents per pound of live weight the Oklahoma poultrymen were able to raise the dressed market grade an average of one fat grade. Even on a diet high in yellow corn the carcass was covered with a smooth layer of pale yellowish-white fat, and the flesh had a milk-fed appearance. Old cocks soon lost all redness, their flesh was tenderized and they had the appearance of prime fowl. Fifteen-week-old cockerels weighing 4½ to 5 pounds were cooked tender in the same way that a 1½ to 2½ pound broiler would be prepared.

—N. J. Farm and Garden

A Leak in Dairy Farm Profits

Condensed from Holstein-Friesian World

R. R. Graves

In most dairy barns in the United States the manure gutters behind the platforms where the cow stands are connected with drains which carry off water when the barns are washed out and which also carry off some of the liquid manure. The liquid manure not absorbed by the bedding material or removed with the solid manure in cleaning the barn is carried out through the drains and usually is lost for fertilization purposes unless some provision is made to recover it.

In many European countries, and on a few farms in the United States, the liquid manure is drained from the gutters, and also from the pit where all the manure is stored, into a cistern. From the cistern the liquid manure is pumped or drawn into tank wagons or trucks and spread on the land. The liquid manure is highly prized for its ability to stimulate the growth of grass or other crops.

The fresh urine from cows has a varying amount of nitrogen, depending on the kind of ration consumed, and other factors. The nitrogen content will vary from 0.8 percent to 1.5 percent and will average just under 1 percent. The potassium content also approaches 1 percent, but the phosphorus and calcium contents are very low. Approximately half of the nitrogen excreted by the cow is in the feces and half in the urine.

Since the urine is a valuable source of nitrogen and potassium, an experiment was conducted at the Woodward, Okla., Field Station, Bureau of Dairy Industry, in co-operation with the Oklahoma Experiment Station, by R. E. Leighton and J. R. Dawson, to determine the amount of urine lost from the manure gutter of a dairy barn during the period of the year when cows are stabled most of the time. There were really two trials.

In the first trial 10 Holstein cows averaging 1,434 pounds in weight were kept in the barn continuously for a 5-day period. The drain from the gutter was sealed and an attempt was made to keep enough straw in the gut-

Reprinted by permission from Holstein-Friesian World, Laconia, N. Y., March 17, 1945

ter to absorb all the urine. The solid manure and the straw with the absorbed liquid were removed separately, several times a day, and weighed.

The average amount of urine voided per cow per day, during this period was 35.7 pounds. This was at the rate of 24.8 pounds per 1,000 pounds live weight. These figures do not differ very much from those obtained by Fuller at the New Hampshire Station, who reported an average of 31.3 pounds of urine per cow per day or 26.8 pounds per 1,000 pounds live weight.

In a second part of this first trial the same 10 cows were kept in the barn continuously for a 5-day period. The drain from the gutter was open and the urine that escaped was trapped and weighed. The stalls were well-bedded with straw but none was placed in the gutter nor within a foot of the gutter's edge. However, the cows pushed some of the straw into the gutter. The gutter was cleaned out twice a day. It was observed that the solid manure blocked the gutter so that little urine escaped into the drain except when the gutter was being cleaned. The amount of urine escaping by the drain was 5.06 pounds per cow per day or 14.2 percent of the average amount voided.

In the second trial 10 cows were again kept in the barn continuously for a 5-day period. The drain was sealed and straw was placed in the gutter to absorb the urine. It was observed that the urine passed rapidly through the straw in the gutter and only that part of the straw that was in contact with the urine absorbed to its capacity. The wet straw was placed in the litter and the free urine was then taken out of the gutter and added to the straw in the carrier. The load was weighed and then dumped on the ground and permitted to drain for 30 to 45 minutes, after which it was reweighed.

In this trial the amount of urine voided per cow per day was 36.7 pounds and the amount of urine lost by drainage was 6.7 pounds or approximately 18 percent. The amount of free urine in the gutter, that the straw did not absorb, was 8 pounds per cow per day or a little less than 22 percent of the average amount voided.

The cow kept cleaner when straw was kept in the gutter to absorb the urine, largely because their tails did not become so fouled. The average of the results of these two trials shows the following:

(1) Amount of urine voided per cow per day, 36.2 pounds; (2) average urine loss per cow per day from drains, or by failure of straw in gutter to absorb,

was 6.5 pounds or 18 percent of the amount voided.

On the basis of the average amount of urine voided by the 1,434-pound cows in this trial, there would be produced in a year, 13,213 pounds of urine per cow, or 9,214 pounds per 1,000 pounds live weight. The 9,214 pounds of urine would contain approximately 92 pounds of nitrogen and 92 pounds of potash. The nitrogen in the urine is equivalent to the nitrogen in ammonium sulfate for plant growth. At the rates charged for nitrogen and potash in ammonium sulfate and muriate of potash, the 92 pounds of nitrogen and the 92 pounds of potash in 9,214 pounds of urine would have a value of approximately $16.56. If 18 percent of the urine goes down the drain where it cannot be utilized for crops, the annual loss is about $3.00 for each 1,000-pound cow, and more for heavier cows, for cows that are stabled the entire year. When urine is voided in the pasture and it quickly soaks into the ground, probably most of its nitrogen is utilized by plants; but urine voided in lots or corrals, where it has a chance to dry out before the manure is removed, loses a large part of its nitrogen as ammonia by volatilization.

It is especially important just now to save and utilize all natural forms of nitrogenous fertilizers because of wartime demands for commercial nitrogen for other purposes.

The leak described here is just one of the many that result in the loss of valuable fertilizing constituents in farm manures. Other experiments show that from a half to two-thirds of the urine nitrogen may be lost in the ordinary storage and handling of manure on the farm, but that subject is too involved for discussion here. However, if half of the nitrogen voided in the urine of dairy cows is lost through improper handling, the loss on a national basis is tremendous. Loss of half of the urine nitrogen per cow per year would be approximately 46 pounds, or a total annual loss of our 27 million dairy cows of 621,000 tons of nitrogen.

The United States Department of Agriculture book of Agricultural Statistics gives the total consumption of fertilizers in all States in 1942 as 8,777,000 tons, having an average nitrogen content of 4.46 percent. Thus there would be 391,454 tons of nitrogen in all commercial fertilizers used in the United States in 1942. If half the urine nitrogen from 27 million dairy cows was lost in 1942, the loss exceeded the total amount of nitrogen consumed in commercial fertilizers that year by 229,546 tons, or 58.6 percent, If the urine nitrogen losses from horses, sheep, beef cattle

and swine were included the excess over the amount of nitrogen used in commercial fertilizers would be far greater.

There are at least two ways of attacking this problem that would help conserve the fertilizing constituents of the manure, particularly of the urine. One is to have a tight cistern into which the liquid manure will drain from the gutters. Straw or other bedding material should be kept out of the cistern. Unless the cistern is located so that its contents can be drained into a tank wagon, a pump will be required to transfer it. A tank wagon or truck will be needed for hauling the liquid manure and spreading on the pastures or fields. In experimental work at the Western Washington Experiment Station, urine diluted approximately 10 times with water used in washing the barn, was applied to pasture herbage on fertile land, resulting in an increased yield, measured in terms of total digestible nutrients, of over 8 percent. When superphosphate was also used, increases in yield in some cases were as high as 40 percent. Approximately 37 hours of man labor and 30 hours of team labor, per acre, were required for applying the liquid manure with a tank wagon.

The other method is that of keeping cows in loafing or pen barns where fresh bedding is added daily and the accumulated manure is packed tightly by the tramping of the cattle. Experiments have shown that the loss of nitrogen by this method, up to the time of removing the manure, is very small. It has the disadvantage of requiring more straw; and this leads to the further drawback that the availability for plant use of the nitrogen in the manure, decreases in proportion to the increase in the amount of straw used. The manure need not be removed until soil conditions are best for spreading the manure and plowing it under or discing it in. Prompt plowing under, or discing in, is essential if the urine nitrogen is to be saved for plant growth.

Growing Trellis Tomatoes

Condensed from Market Growers Journal

Robert E. Young

Asst. Research Professor, Vegetable Gardening, Massachusetts State College

TOMATOES, one of the most important market garden crops in Massachusetts, are sold almost entirely in local stores, few are shipped or canned commercially. During recent years there has been a change from the old method of culture in which the vines were allowed to grow untrained and unpruned. Under the new system the plants are supported on trellis or stakes, much as they are in the greenhouse. The only difference between the trellis and stake methods is the manner of supporting the plants. Some of the first growers of trellis tomatoes grew two rows in a hotbed, keeping the sash on until the plants were quite tall, and much of this fruit went to the market as greenhouse tomatoes.

The shift from flat culture to trellis by the general market gardener started about 1930 and is still continuing. Because of the increased income, growers are willing to go to the expense and trouble of constructing a trellis on which to support their tomatoes. The results are fruit of better quality, greater early yield and larger total yield. Trellising tomatoes increases the cost of production, as more plants per acre are required; posts, wire and string are necessary, and considerable labor is needed for pruning and training, however, these added costs are offset in part, at least, by easier spraying of the plants for insect and disease control and more efficient picking of the fruit because the degree of ripeness can be more accurately determined. Growers who have adopted the new system obtain fruit which stands up longer on the market—a matter of much importance in getting fruit of first quality to the consumer.

One part of this experiment was a comparison of first-grown

TABLE I

Treatment	Yield per Acre, Pounds						No. of Fruits per Pound
	Waltham		Amherst		Combined Crop		
	Early	Total	Early	Total	Early	Total	
Double-stem Trellis ..	11,796	41,845	8,002	48,750	9,899	45,297	4.95
Flat Grown	4,111	37,570	3,590	35,730	3,850	36,650	5.96

and trellis tomatoes, and the effect of trellising on the yield of fruit is shown in the table (No. 1). Although the difference in total yield is not great, it is in favor of the trellis method.

In taking the harvest records the first three pickings were considered the early portion. There was some difference between results obtained at Waltham and at Amherst, but part of this was due to soil type and weather. The season warms up faster at Waltham, thereby producing a larger yield of early fruit. It is in the early yield that the trellis tomatoes show up to greater advantage. The trellised plots averaged a little over twice as much early fruits as the flat-cultured plots. The Waltham average was even greater, for in two of the four years of the experiments the trellised plants produced four times as many early fruits. There was little difference in the size and quality of the early fruits, but for the complete harvest the fruits on trellis were larger.

With the new method of culture came a change to a small variety of fruit; and with the smaller, firmer tomatoes produced on the trellis, growers are in a better position to meet competition from other areas.

Varieties for the Trellis

The market demand decides, to a great extent, the variety of tomato for use on trellis; although the number of fruits per cluster must also be considered. Boston pays high prices for the small, more uniform tomato of the Comet type, and when growers changed from flat culture to trellis they also shifted from varieties such as Marglobe, Bonny Best and Early Prolific. In general, the larger-fruited types, especially when grown on trellis, have not held their foliage in many seasons and, therefore, have not produced satisfactory yields.

Comet generally produces a large number of fruits, while the larger fruited varieties produce only a few fruits per cluster, and when the plants are kept pruned, the number of these clusters is definitely limited so that the possible yield is reduced. Comet produces so many fruits that at times under poor cultural conditions the plant is not able to grow them all to marketable size.

The first tomato used for trial was the Waltham Forcing, which is a greenhouse tomato. It is of the Comet type and was obtained by selection from the old English Best-of-All. This tomato was improved through selection, and Waltham Forcing is now the most important greenhouse variety in the State. Growers who used it inside also tried it on the trellis outside and reported satisfactory results.

The other variety of tomato developed at the Waltham station is Trellis No. 22, a cross between Waltham Forcing and Lloyd Forcing. It is a few days later in maturing than Waltham Forcing and on the field station plots does not yield as heavily, but the fruit is larger and it makes a little better pack for market. The behavior of these two varieties is not consistent throughout eastern Massachusetts, as in one section Waltham Forcing is always larger and superior to Trellis No. 22, which is just the reverse of the experiment of most growers.

When grown on trellis the Waltham Forcing, Trellis No. 22 and other strains and selections of Comet averaged 4.5 fruits per pound for the season; Michigan State Forcing averaged 3.6 fruits; Stokesdale 3.2; Bonny Best 3; Rutgers 2.8, and Marglobe 2.7. The total yields in a good growing year do not differ greatly, but the smaller varieties always produce a larger percentage of No. 1 fruits.

Selection of the proper variety is important for success with trellis tomatoes, and this section cannot be made without considering the soil, fertilizing program, irrigation, market and climate. Varieties suggested for trial in order of their probable value on most of the Massachusetts farms are Trellis No. 22, Waltham Forcing, Comet, Stokesdale, Michigan State Forcing, Bonny Best and Marglobe.

One of the most important factors in the successful production of tomatoes, whether grown on trellis or untrained, is to have good plants. There is no one best method of growing plants. The plant growing facilities on each farm differ so that the problem is an individual one. It is probable that only after some experience will satisfactory plants be produced.

For a crop such as trellis tomatoes, in which a considerable sum of money is invested, it is necessary to have the soil in the best possible condition, and many failures can be attributed directly to lack of fertilization and proper soil preparation.

It is important that trellis crops have a uniform supply of moisture and plant food throughout the season. Soils well supplied with organic matter, such as some of the older intensively cultivated areas around Boston, hold a good supply of both water and plant food.

In the Waltham and Amherst experiments, most of the crop was given a coating of cow manure at the rate of 10 to 12 cords per acre. Certain plots received no manure, while others received a double amount, with heaviest treatment 20 to 25 cords per acre. The experimental plots were

moved to a new area on the station grounds each year so that there could be no cumulative effect. All plots received one ton 5-8-7 fertilizer per acre broadcast.

Setting the tomato plants, putting up the trellis, wire and string and spraying make it necessary to walk over the soil a number of times, and if a good job of plowing and fitting the land is not done before these operations are started the soil becomes quite compacted. Proper soil preparation is important enough to justify taking time for a thorough job. Before preparation of the soil starts, consideration should be given to the need for lime. Better results from the fertilizer and manure will be secured if the soil is slightly acid (pH 5.8 to 6.5). If lime is to be applied it is essential that the application is even and uniform.

The trellis to support the tomato plants can be constructed either before or after the plants are set. Most growers put in the plants, furrowing out with a plow to aid in the setting, and construct the trellis along the row after the plants have started to grow. If the trellis is put up before the plants are set, there will be no danger of damaging them with posts, wire or tools, but when the plants are set the holes must be dug with trowel or shovel.

There are many types of trellis, but the most common is one having substantial end posts, such as 4x4 or 3x4 inch. These are anchored with a guy wire or stake four or five feet beyond the posts. The supporting posts are placed fifteen to twenty-five feet apart along the row. These can be of 1-inch or larger pipe, 2x4's or 3x4's, but they must be strong enough to support considerable weight. The wire (No. 9 or 11) is strung along the top of the posts. It should be stretched as tight as possible so that there will be little sag when the plants become heavy, and can be kept in place on the wooden posts by stapling and on the pipe by inserting a loop of wire over it and into the pipe. A smaller wire, No. 18 or 19, along the bottom on which to tie the strings completes the trellis. It is generally considered better to have this bottom wire and to tie strings somewhat tightly on the top and bottom wires than onto the plants. The string for supporting the plants should be a stout one, such as three to five ply jute or binder twine.

If a supply of inexpensive stakes is available it will probably be cheaper to use these than to build a trellis. When the plants are to be pruned to a single stem, a stake is driven beside each plant. If they are pruned by two stems, two stakes

are needed. A disadvantage in using stakes is that the plant has to be tied to the stake, whereas with the trellis the plant is twisted around the string. It is difficult for inexperienced farm help to tie the string around the stake securely and yet keep it loose enough so that the plant has room to grow. Before the tomatoes are set in the field it is necessary to decide just how they are to be trained and spaced. In these experiments it was not possible to include plots in which the plants were given different spacings except in relation to the number of stems. The distances were twelve inches for plants trained to a single stem, twenty-one inches for plants trained to two stems, and four feet for untrained plants. The distance between the rows was four feet.

A new method practiced by one grower was to vary the distance between the rows by placing two rows close together (two feet) and then allowing six feet to the next row. That allowed space between rows to drive small tractors for hauling spraying equipment and wagons to pick up fruit.

Both at Waltham and Amherst the plants twelve inches apart and pruned to a single stem produced the largest yield of early fruit and the greatest total yield.

After the trellis is up, the strings are on the wire and the plants have started to put out new growth, it is time to begin pruning. The tomato plant has one central shoot or leader. At each joint or leaf a shoot comes out if these are allowed to grow, the plant will produce a large bush with many stems. which cannot be tied up or supported on the trellis. If the plants are to be pruned to a single stem, only the central shoot is allowed to grow. The side shoots or suckers, as they are sometimes called, are removed when they become two to four inches long.

Pruning delayed until side shoots are six inches long reduces the vigor of the plant. If the plant is to be pruned to two stems, the central shoot and one side shoot are allowed to grow and the remainder are removed. One side shoot will be found to be more prominent and vigorous than the others, and if this is not over ten inches from the ground it is the best one to leave. It is necessary to prune the plants and twist the stems around the string every week during early period of rapid growth.

Early in the season trellis tomatoes need to be cultivated to keep down the weeds. Cultivation should be shallow because deep stirring of the soil cuts many of the roots. Unless there are weeds to be killed do not cultivate.

Fire Fighting Methods and Equipment for Rural Communities

Condensed from Agricultural Engineering

H. G. Ingerson
Member A. S. A. E.

ACCORDING to the Extension Service of the U. S. Department of Agriculture, there are 3,500 lives lost in farm and rural non-farm fires each year and the rural property loss is $225,000,000 or 65 per cent of our national fire loss.

Rural communities can soon have very complete fire protection by using methods and equipment perfected during the war.

To show the need for better methods of fire control I shall describe just two rural fires in which I had personal experience. The first was a fire which threatened over $50,000 worth of new farm buildings and equipment. A large orchardist in northern Ohio, near Cleveland, had built a group of three buildings, two large fruit storages and a combination fruit packing house and by-products plant. For efficiency in transferring the fruit from the storage houses to the packing room, these buildings were grouped closely together. They were of frame construction with stucco exteriors, but unfortunately the stucco had not been completed on the central building. The packing room was between the two storages. A refrigeration compressor was located in the service room at one end of one of the storage houses. It was expected that electric power would be available to operate the compressor, but the power line was delayed and a tractor was being used to power the compressor. A workman disobeyed orders and filled the tractor while running. Some gasoline spilled, ignited from the tractor coils and the service room and adjacent sides of the packing house were in flames almost instantly. This farm was five miles from the nearest town and the only fire equipment there was a "pumper" which could work only from a city water supply. Fortunately the owner had equipped his modern packing house with two chemical extinguishers. These together with a fortunate turn of the wind allowed the workmen to

Reprinted by permission from Agricultural Engineering, Dec., 1944, St. Joseph, Mich.

bring the fire under control. Fire equipment such as we will describe would have been ideal for this condition.

The other fire was in a farm home. Riding with a friend a few miles out of Port Washington, Wisconsin, we saw a frame summer kitchen on the rear of a substantial brick farmhouse all in flames. There was no one around the fire, and it appeared that the owners might be away. We drove into the yard, went to the house, and the owner's wife came to the door. Yes, she knew of the fire, had telephoned to the nearest town for fire equipment, and had sent her son to the back of the farm to call his father. My friend inquired what fire department had been called, and as several neighbors were in sight, he went to see if he could hurry up the fire department. When he reached the fire station, about three miles distant, the truck driver was having trouble starting the ancient Model T fire truck. Finally it got underway, and was about half way to the fire when it stopped for want of gasoline. My friend had a tow rope and towed the fire truck to the fire. Again this truck had only a "pumper," and the only source of water was a cistern at the barn, too far away for the hose lines to reach the fire. By this time the fire had quite burned itself out, and by virtue of the house being brick and the neighbors and myself carrying many pails of water from the cistern to the upstairs of the house where we could fight back the small fire that ran in around a window, the house was saved.

These are just two instances of farm fires at which I have been present, but in neither case was adequate equipment or a trained rural fire fighting crew available, and more by good fortune than good management were the buildings saved.

By contrast, and to show what can be done with suitable equipment: Another rural fire was brought under control in less than 4 min. by high-pressure fog (600 lb. per sq. in. at the gun or nozzle) with an amount of water that can be hauled by any good 1½-ton truck. The building was an abandoned hunting lodge approximately 50 x 30 ft. in ground dimensions, one story high and built of tamarack logs. It was extremely dry. It had not been used for several years and was a fire hazard in case careless campers or hunters should use it. Permission was secured to use it for a test of the high-pressure fog fire fighting method. Some inflammable material was placed in one corner of the building and a match touched to it. Within two minutes of the start of the fire the entire building was in flames. It had been agreed between the

county agricultural agent who made the arrangements for this fire test and the firemen that they would try to cut the fire off at a partition, about one-third of the length of the building. Two firemen worked on this fire, each with a high-pressure fog fire gun discharging 30 gallons per minute when wide open. The total time elapsed from the time the firemen started work until the fire was under control was just under four minutes; the fire was out in six minutes, and the total water used was just under 350 gal. As a result of this and similar tests, there are now several high-pressure fog fire fighters owned by the townships in Oscoda County, Michigan, making real fire protection available in a sparsely settled rural community where farm fires and forest fires had long been a dread.

Now what are the principles involved in this high-pressure fog fire fighting method? Several fundamental principles are working together, including very rapid (almost instantaneous) conversion of the very fine water particles (fog) into steam. This action absorbs a tremendous amount of heat and quickly lowers the temperature of the burning material until it is below the burning point. The steam in turn smothers or "blankets" the fire by displacing the air, that is, shutting off the oxygen needed for combustion. The whole action is so fast that it is hard to believe what one is actually seeing.

This method has been used successfully on hundreds of structural fires in the past few years. It has also been used extensively and successfully for controlling airplane crash fires to effect the rescue of the pilot and his crew, and it is being used in industrial fires where highly inflammable materials are involved and where chemicals or other means of fire control are not suited. It is being used by city fire departments as an auxiliary to other methods and other types of equipment.

The equipment we recommend for rural fire protection consists essentially of a 60-gpm. (gallon per minute) displacement type pump suited to continuous operation at pressures of 800 psi (pounds per square inch). This allows for pressure at the gun of 600 psi even with long leads of hose. The pump is operated through the split-shaft type of power take-off unit from any of the lighter models of motor trucks, such as International, Ford, Chevrolet and others of that size. A tank holding approximately 400 gal. of water is mounted compactly in the unit, the entire mounting being as low as possible for stability and suiting the equipment to traveling the highways at high speed. An important consideration is the

protection of the pump and piping against freezing, and this is accomplished by taking advantage of heat from the truck motor exhaust. The discharge of water is carried to two lines of high-pressure, ¾-in. rubber hose. These lines of hose are compactly mounted on live type hose reels and, excepting during severely cold weather, pressure is carried in the hose and guns at all times. Suitable connection is provided in the suction piping for connection to a fire hydrant, if such is available; this same connection is used for taking water from any type of water storage where this is available.

Two very important parts of the equipment are the specially designed high-pressure fire guns. These are designed so that one fireman can handle a line of hose and the gun by himself, and the gun is quickly and easily adjustable from the long solid type of stream to a close-up, fine water fog. The total weight of the equipment above the truck chassis is approximately one ton, and when the tank is filled with water, the gross weight is approximately 2½ tons. The conventional 1½-ton truck carries this load readily as the entire unit is compact and the load well distributed. The important accessories are floodlights, ladders, axes, pike poles, wire cutters and other small hand tools. Space is provided so that six firemen can ride comfortably, but there would rarely be more than two on the equipment as it goes to rural fires.

This high-pressure fog method is especially suited to rural fire control for several reasons: (1) Most rural fires are building or structural fires which are easily controlled with water. (2) Most farm fires are discovered soon after they start. (3) The call can be made to the fire department, and the fire brought under control after the equipment makes the run. (4) The fire-fighting equipment has the water right with it, and this water can be doing effective work on the fire within seconds after the equipment arrives. (5) The water and pressure is in the hose and gun, and no time is lost putting a suction hose in a cistern or pond, if there is such a thing nearby. There is no waiting for valuable minutes to get "pressure up" as the firemen can get the high-pressure fog on the fire almost instantly. (6) A small fire crew only is needed. The truck driver operates the pump, regulates the pressure, makes the accessory equipment of ladders, axes, lights, etc., available while the farm owner and trained neighbors handle the fire guns. I emphasize the word "trained," because the success of any rural fire control program depends on trained local people. (7) This type of

high-pressure fire fighting equipment is suited to rural communities because of its very high over-all efficiency in fire control with very nominal first cost and low maintenance. The high-pressure hose lasts several years in fire service and there is very little other upkeep cost. (8) These fire fighters can be mounted on makes of 1½-ton trucks on which service is available in nearly all communities. (9) Very little water damage occurs to homes and furnishings in case of farmhouse fires, or to grain, hay and machinery in case of farm building fires. The protection of the water fog will usually permit the removal of livestock in case of a bad barn fire.

Now we come to the very important place where we believe college agricultural engineers can render a vital rural service. Rural communities — villages, townships, counties—have long *needed* and *wanted* better fire protection. Matters of legislation and taxation are involved in providing financing for the purchase of equipment, in paying truck drivers, in providing suitable garages for the equipment, suitable fire-call systems and other items that enter into an adequate fire control system. Next help is needed in organizing communities properly in relation to roads, some on county lines and some on township lines, and tieing these rural communities into the municipal fire control areas.

These are but a few of the services that farm communities are going to expect from agricultural engineering departments of their colleges. Others will be the supervising and training of leaders in fire control methods. This will include county agents, assistant county agents, vocational-agriculture teachers, and F.F.A. leaders. These leaders will in turn train local rural people—men, boys, women and girls—in their duties at a fire at their farm or a neighbor's farm. Supplementary water supplies will be desirable; suitable sources of water along the highways should be located and marked, and each fire crew should know which source is closest to each farm. Auxiliary water supply trucks should be available, such as milk trucks. Each farm should work toward having some additional water available and accessible. Agricultural engineers can help by suggesting practical methods under the prevailing conditions.

He Rebuilds Georgia's Soil

Condensed from The Commercial Appeal

Robert Talley

Staff Writer, The Commercial Appeal

IN THE rutted clay hills of Georgia, a bare 100 miles southwest of Atlanta as the single-track railroad winds its sinuous way through the stunted scrub-pine, a business man who turned to farming as a hobby is showing his state and the "Old South" a path out of their rockiest problem—that of increasing the small farmer's income.

It is one of the most amazing agricultural developments in America and, to date, a highly successful one. If it succeeds in practice as well as it has in experiment, its effect on the South's agriculture and business as well may be revolutionary.

Father of the plan is Cason J. Callaway, 50 years old and one of Georgia's wealthiest men, who has retired from one field of endeavor to devote his life to another. For a dozen years he was, successively, president and chairman of the board of Callaway Mills, Inc., a family institution whose huge textile mills have consumed much of Georgia's cotton crop for the past half century, and he also served with distinction as president of the American Cotton Manufacturers Association. Now he has chucked all his business connections except his positions as a director of the United States Steel Corp. and New York's huge Chemical Bank & Trust Co. to devote, and donate, his efforts to building up the South's millions of run-down farms.

In purpose, Mr. Callaway's plan is similar to that of *The Commercial Appeal's* annual Plant to Prosper Competition which now enrolls more than 100,000 Southern farm families, as it encourages production of supplementary food and feed crops, in addition to cotton . . .

The story behind Mr. Callaway's new venture is as colorful as fiction, as solid as fact. It is the story of the land's annual gross income already upped from $5000 to $300,000.

Ten years ago, seeking weekend freedom from telephone calls and business conferences, he built himself a cabin amid the scrub pines in the scrawny, red clay hills of Harris County, four miles west of the little town of Hamilton. The region, abandoned to

Reprinted by permission from The Commercial Appeal, Memphis, Tenn.

the wilderness after successive generations of farmers had drained the once-rich soil of its last vestige of fertility, was about as desolate as one could imagine. But that seclusion was just what the owner wanted.

Five years ago Mr. Callaway began farming a few of his desolate acres in an experimental way. It was a challenge to his resourcefulness and ability to make some of the poorest soil in Georgia — which could hardly support a share cropper and his ragged family—produce profitable crops and a living income. First, he put men to work with growling bulldozers that knocked down the scrubby second growth pine and cottonwood trees and filled up the deep gulleys in which a mule could drown in rainy weather. Then he began rebuilding the impoverished soil with lime and acid phosphate, and planting thereon cover crops of alfalfa and crimson clover, turning under several successive crops of each.

"It was no use to plant a cover crop until you had first treated the soil, because the soil was so poor it wouldn't even grow a cover crop," Mr. Callaway says. "I don't guess there was ever any more worn-out land anywhere in the world."

Today, Mr. Callaway's huge Blue Springs Farms has spread from its original 2500 acres to nearly 30,000 acres, with more than 3000 acres in cultivation and much of the rest devoted to such other purposes as turkeys, ducks, chickens, dairy cows, scuppernong vines, blackberries and even the production of fish in artificial lakes. Experiments are also being made with other products.

This year, according to its owner, Blue Springs Farms will do a gross business of more than $300,000 and within two years he expects the annual gross to reach a half million dollars. Contrast this with the records of the County Agricultural Agent which show that the annual income from the 30,000 acres a few years before Mr. Callaway took over, eked out by a few scattered share croppers who tilled their scrawny patches of cotton and corn, was less than $5000.

A magic transformation has been wrought on this land which was once abandoned as useless and given back to the wilderness from which Georgia's hardy pioneers had carved it a century and a half ago. Vast areas have been cleared of the low second-growth timber, the cavernous gulleys have been filled, the paper-thin topsoil deepened and restored to production.

"Poor land is the basic obstacle to profitable farming," says Mr. Callaway. "For generations our forefathers literally 'mined' the soil. There was an abundance

of land and when one area was worn out another was taken over, and the abandoned land was left to continue to erode. Eventually our depleted land was largely left to tenants whose only means of existence was the planting of annual cash crops, which continued until all the richness was taken from the soil and even they had to move off."

But mere improvement of the soil wasn't the only idea this textile magnate-turned-farmer had in mind. In seeking to make worn-out and rebuilt land pay a profit, he aimed at what he called his "Four points of perfection."

These were:

1. A choice of crops that would do best on restored soil.

2. Crops that needed to be planted only once; perennials that would renew themselves each year and thus save the cost of spring planting.

3. Crops that would improve the soil as they went along, year after year.

4. Crops that would provide something that was needed, something that could be readily marketed for cash.

Kudzu, a vinelike hay imported from Korea, which requires three years for a stand but which never requires replanting, seemed to meet all these conditions. So did Scuppernong grapes (one Virginia arbor said to have been planted by the "Lost Colony" is still flourishing), blackberries, blueberries and, of course, such old familiar favorites as lespedeza and crimson clover.

Today hundreds of acres on Mr. Callaway's Blue Springs Farms wear their velvety green carpets of kudzu, a low vine that sinks its roots 20 feet into the ground and bears annual crops indefinitely. When ordinary harvesting machines refused to cut the stringy kudzu, Mr. Callaway brought in factory experts who adapted the machines to this job. When the freshly cut kudzu hay mildewed Mr. Callaway built a dehydration plant—the only one of its kind in his section of the South—which dried the clover-like plant and ground it into a fine meal, for use in stock feeds. Throughout the harvest season this big dehydration plant hums 24 hours a day, five days a week as it produces kudzu meal at the rate of 20 tons a day, which is sold for $65 a ton.

For the cultivation and harvesting of all these crops Mr. Callaway purchased tractors and other farm machinery to reduce manual labor to a minimum—on the whole 30,000 acres of Blue Springs Farms there isn't a single horse or mule; tractors, rubber-tired trailers and farming machinery of many kinds chug all over the place, even harvesting at night by means of their electric headlights when the occasion re-

quires. The whole farm and its dehydration and other plants is worked by 80 employes who are paid cash wages.

But crops weren't all to which Mr. Callaway turned his resourceful ingenuity. Several years ago the late Howard Coffin, Packard motor magnate, gave Mr. Callaway five wild turkey hens and one male bird from the hunting preserve on his palatial estate at Sapeloe Island, Ga. That, augmented later by other purchases, started Mr. Callaway's present flock of 4000 wild turkeys which are slaughtered and sold on the commercial market. Similarly, a few Mallard eggs purchased in North Dakota was the beginning of Mr. Callaway's flock of 12,000 wild ducks.

Both the wild turkeys and the wild ducks are frozen in quick-freeze plants on the farm, attractively packaged in special cartons and shipped to buyers all over the United States. Some of the huge Big Breasted Bronze turkeys weigh 35 to 40 pounds on foot, as much as 20 to 25 pounds when table dressed. Similarly, the Mallard ducks weigh 2½ to 3 pounds when dressed and frozen for shipment.

Dairying? Yes, Mr. Callaway has that, too. He restored a 100-acre pasture whose soil was so poor that it would hardly feed a billygoat without an extra ration of tin cans and placed 75 pure-bred cows thereon. Today that pasture is feeding these cows the year around without one ounce of extra provender.

Fish? Mr. Callaway cleared a 40-acre tract of bottom land, built a dam, turned in the water, stocked the lake with 2-pound strawberry brim and bass. Two minnow ponds built at a higher level, and which can be tapped at will, supply the food for the brim and bass. Around the entire 40-acre lake is a diversion ditch to carry off the rainwater; the lake will never silt up.

In a few years' time this retired textile manufacturer has transformed a barren area of Georgia's wornout clay hills and converted a hobby into a business grossing upwards of $300,000 a year. He had proved, to be sure, that it could be done—but he hadn't proved how the average small Georgia farmer, lacking the unlimited capital of a retired millionaire, likewise could be successful.

Mr. Callaway, having already demonstrated on his 30,000-acre Blue Springs Farms, that even the worst of Georgia's worn-out red clay can be rebuilt and made to produce flourishing crops, is now out to show his state's small farmers how to do the same—and how to make their little farms pay without the benefit of a rich man's unlimited resources.

His vehicle is a string of 100

small demonstration farms scattered throughout the state, each to have a corporate set-up, to be financed locally and to be known as "Georgia Better Farms No. —, Inc." Each of these little demonstration farms of 100 acres is to have as its shareholders seven leaders in its community—merchants, bankers, lawyers, doctors, large farmers and others—who will invest $1000 each to provide $7000 working capital for the corporation, which will follow Mr. Callaway's farming methods.

The plan has raced through Georgia like wild-fire. In the past few weeks, more than 1000 business and professional leaders from throughout the state have flocked here to be Mr. Callaway's guests at huge open-air luncheons, served on his farm, and hear him explain his program.

Already practically all of these 100 "Georgia Better Farms Corporations" have been organized in counties throughout the state by groups of seven public-spirited citizens who have invested their $1000 each and charters of incorporation have been obtained. The number of these 100-acre demonstration farms is limited to 100, because that is all that Mr. Callaway thinks can be adequately directed.

For the story of Mr. Callaway's plan for aiding the small impoverished farmer and how it is to operate, let us quote from his address before a group of luncheon guests.

"Ever since I was a boy," he says, "I have heard that farming is a hard way to make a poor living and a poor way to make a hard living. It shouldn't be.

"I am convinced that the greatest problem in Georgia today is the situation of the small Georgia farmer. I am equally convinced that by wise, courageous leadership this problem may be largely solved. It is a heartening sign that so many of the state's business, civic and professional men are assembled at this meeting. I construe it as indicating a serious interest in the problem, and a willingness to provide the necessary leadership for a constructive, sound, workable plan. If such leadership for that kind of program in your area of the state evolves from this meeting, our joint efforts might he historic in their influence within the borders of Georgia and even beyond."

Then Mr. Callaway goes on to repeat what every Georgia business man knows and what few of them like to be reminded of—that the gross income from cash crops of 58 per cent of Georgia's farmers was less than $400 per year in 1939. Less than $400 a year was all that more than half of the state's farmers had for spending money—and out of that had to come the depreciation on

a mule with an average lifetime of 12 to 14 years; repairs, if any, on his house; rent, taxes, insurance, upkeep of his plow and implements, clothing, doctors' bills and education of his children.

Mr. Callaway tells his audience of business men and others, many of whom are by now feeling a keen pocketbook interest, that the first problem to be solved is the rebuilding of Georgia's worn-out soil, drained of its fertility by many generations.

Dipping into specific objectives, he goes on.

"There are four things which we must do," he says. "First, we must improve our soil; second, we must have long-term commercial credit; third, we must use machinery to work our crops; fourth, we must have processing plants near our farms."

Poor land, Mr. Callaway tells his audience, is the basic obstacle to profitable farming. He relates how Georgia's farm land as a whole, including the recent rise in price, will now average only about $30 an acre.

"We are forced to compete with farm land outside our section of the South which will average $150 an acre," he continues. "I believe we will agree that we can no more do that than a man with a broken-down $300 truck can compete against a man with a $1500 truck.

"The only way we have been able to survive in the past with this broken-down tool has been with farm labor at around 75 cents to $1 a day. I do not believe that within our lifetime we will ever see that wage scale again; and I think that is all right. But whether you or I think it is all right or not has nothing to do with it. We must get out of the position of trying to take $30 land and compete against $150 land, or else continue to move off our land and leave it as we have been doing for the past 20 years.

"Now, if we take it for granted that we can't take a $300 truck and compete with a $1500 truck, still, if the $300 truck is all we have, we might spend $400 replacing the moving parts, and, with this $700 truck, compete with the $1500 truck. Similarly, we might take this $30 land and spend $40 an acre on it, giving us $70 land, and with this $70 land compete with the $150 land.

Mr. Callaway then told of some of his own experiences in concrete example. Oats, for instance—he spent $40 an acre to rebuild the worn-out land, thereby increased production from Georgia's average of less than 18 bushels an acre to 58 bushels per acre. This investment of $40 an acre in building up the land would, at six per cent, represent an annual rental of less than $2.50 an acre; or, at 10 per cent,

an annual rental of $4 per acre. At their lowest price of 40 cents a bushel, he said, oats would produce $16 more revenue from the acre of built-up land at a cost of $2.50 to $4. At present prices of oats, around $1 a bushel, the profit from building up the land would be even greater.

"It costs no more to plant, fertilize and harvest oats on good land that will produce 58 bushels to the acre than it does on our average land which can produce no more than 18 bushels to the acre," he emphasizes.

Once the land is restored, Mr. Callaway goes on, the turning in of soil rebuilding cover crops will keep it that way. Georgia's warm summer sunshine and its yearly 50 inches of average rainfall will do the rest.

Again the speaker refers to the 58 per cent of Georgia's small farmers whose cash income in 1939 was less than $400 a year.

"If our land were built up, or put in permanent crops," he goes on, "you could expect as an example, a gross income of $400 in cash a year from two acres of scuppernong grapes used by the wine industry; a gross of $400 a year or more from two acres of blueberries used by the canning industry; these are only two examples of what can be done. Then, too, there are such crops as kudzu, lespedeza, White Dutch clover, chickens, turkeys, geese, ducks."

The first task of the 100 demonstration farms embraced in the "Georgia Better Farms Corporation," each locally owned and operated, will be to improve the depleted soil, he explains. Approximately $3000 of each corporation's $7000 capital will be spent to purchase the land itself, the remaining $4000 for restoring its fertility to make it pay. If the land costs less than $30 an acre, there will be more to spend for its improvement.

"After the corporations have been built up, each corporation is to borrow not more than $3000 from the bank, for current inventory, farm machinery, cows, etc.," Mr. Callaway continues. "The exact plan, however, will be left to the individual corporations —a program best suited to the area's particular needs in the opinion of the seven local men who have invested $1000 each for the necessary $7000 capital. Every one of these demonstration farms should employ a hired manager, responsible to the corporation's board of directors. When the three-year demonstration is completed the farms will be sold, preferably to the hired managers."

And so it is that these 100 demonstration farms of 100 acres each, scattered through the state, are expected to set the pattern

for a new day in Georgia's agriculture—a program estimated to require three years. It is to be a program of rebuilding the worn-out soil, of substituting the tractor for the mule and the plow, of growing perennial crops that require little labor and no replanting, of using the time thus saved for the production of new cash crops such as chickens, turkeys, geese, ducks, milch cows, and even honey bees that will help pollinate the clover, and fish from the well-stocked lakes that each demonstration farm will have.

Each of these small farms will be a miniature of Mr. Callaway's 30,000-acre, $300,000-a-year Blue Springs Farms, adapted to local conditions.

"Just give me three years to get this thing started," he says. "That's all I ask."

A New Thinning Device for Peaches

George P. Weldon

The high cost of thinning peaches, especially during times of inexperienced labor and abnormally high wages, offers a challenge to every grower to devise if he can, satisfactory means to hasten the removal of peaches and reduce the cost of same. Last season while employing a crew of some 25 Mexican nationals none of whom had ever thinned peaches before, it soon became apparent that the per tree cost of thinning was altogether too high. In figuring on something better to reduce the load of fruit than the ordinary stick or stick with a piece of garden hose on the end, the idea of some kind of a loop came to me. An old V-shaped auto fan belt and a light fishing pole furnished the material for the first stripper as it was called. Soon we had several of these strippers at work and estimated that they saved at least 25% on the cost of thinning.

A stripper consists of a light piece of bamboo as long as necessary to reach the top of the trees. Ours ranged from 6 to 8 feet. At the small end of the pole the fan belt material is reversed and made into a loop 8 inches long and 5 inches wide which is securely wired and taped. This device may be used to jar, knock or strip off the fruit. We found it to be better than any other yet tried. A number of growers have already taken up with its use and we have recommended it for trial by all who have peaches to thin and find the work to be expensive.

—Rural Pacific Press

Good and Bad Health Is Traced Back to Soil

Condensed from St. Louis Post-Dispatch

James Rorty

Author of "American Medicine Mobilizes" and of a forthcoming book, written in collaboration with Dr. N. Philip Norman, on postwar nutrition

A VITAMIN capsule a day will keep the doctor away, if one is to credit the enthusiasms of a business which last year was expected to reach a volume of nearly 200 million dollars. But so, and much more reliably, will a balanced diet of natural foods, provided these foods are grown on fertile soils, rich in their content of essential minerals.

For more than a decade the close relationship between healthy soils, on the one hand, healthy plants and healthy domestic animals on the other—(and the opposite, too, of course)—has been well known to our more advanced health workers, as well as to the pioneers of soil science, among whom Dr. Albrecht is certainly one of the most distingushed.

Five years ago, the investigation of this relationship became the task of what is perhaps the most comprehensive research program ever launched by the United States Department of Agriculture. This project has its general headquarters in the new plant, soil and nutrition laboratory at Cornell University and is directed by Dr. L. A. Maynard, a nutritionist of international reputation. Actually, however, only a small fraction of the vast volume of soil, plant, animal and human nutrition research embraced in the project is being done at the laboratory.

Practically every agricultural experiment station in the country is busy on some aspect of it, not to mention a score or so of university and commercial laboratories. Month by month the progress reports have been bulging the technical journals of a dozen specialized fields. What is involved, potentially at least, is a revolution involving not only our total food economy and culture, but the science and art of medicine as well.

As Dr. Albrecht has intimated, the doctors of the future will be concerned primarily not with treating the symptoms of disease but with constructing the architecture of health, both for the individual and for the society. And

Reprinted by permission from the St. Louis Post-Dispatch, St. Louis, Missouri

as they assume this new and greater role their chief instrument is likely to be food. Here are a few of the more startling findings of the nutritionists, biochemists and soil chemists who are stretching the chain of nutrition research link by link back to its source in the soil from which all life springs.

In 1938 Dr. Ouida A. Abbott became interested in the nutritional deficiencies of less privileged Florida workers on the land. Malnutrition was most acute, she noted, among the inhabitants of a particular county where the soil was composed chiefly of gray and white sand, and where the cattle suffered from a local ailment known as "salt sickness." In this area from 52 to 96 per cent of the children were anemic, while the other districts, where the cattle were healthy, less than 23 per cent of the children were anemic.

True, the anemic children also had hookworm, but when they were cured of worms their blood counts didn't go up; whereas, without removing the parasites, it was possible to restore the children's blood count to normal, simply by giving them iron.

Previous work by the Florida Experiment Station had shown that deficient soil and deficient forage caused the salt-sickness of the cattle. How about the children? They were good children, it seemed, and ate their turnip greens. But when these greens were analysed, they were found to contain only about a fifth as much iron as turnip greens grown outside the district on healthy soil.

Just to make sure, the experiment station planted the same kind of turnip seed in four different Florida soils—and harvested four different grades of turnip greens, differing sharply in leaf form, succulence, and mineral content. Summing up her findings, Dr. Abbott wrote:

"It appears, then, that soil deficiency operating through the plants grown thereon, and ultimately in the health of the people, is a factor that should be considered in any section where nutritional anemia is endemic."

How many sections of this sort are there, and where are they? Nobody knows as yet with any precision. That is why the Plant, Soil and Nutrition Laboratory is conducting a census of American soils—or rather, a census of our soil troubles.

Fourteen elements are definitely known to be required for normal plant development. They are: carbon, hydrogen, oxygen, nitrogen, phosphorus, potassium, calcium, magnesium, sulphur, iron, manganese, copper and zinc. Animals require all of these elements except boron and in addition they have been shown to need varying

amounts of sodium, chlorine, iodine and cobalt and boron. Finally, there are several mineral undesirables: selenium, thallium, fluorine, chromium, lead and arsenic. Under certain conditions of soil and climate even microscopic quantities of these elements may bring about the poisoning of both animals and man.

Just to complicate matters, a soil may contain an actual surplus of a given element—phosphorus, for example—but in forms which the plants are unable to use.

A surplus of available phosphorus in wet weather may become a deficiency during a drouth. Excessive liming or unbalanced fertilization may create a deficiency where none existed before, by bringing about undesired chemical reactions and fixing a needed element in unavailable forms. Some of the trace elements such as boron are essential in microscopic quantities—a few parts to a million, but actually poisonous if the boron content is raised to only 20 parts in a million. We discovered that as far back as World War I, when a shipment of fertilizer high in borax destroyed a whole potato crop.

In the diagnosis of soils it is the sick animal—or the exceptionally healthy animal—that ordinarily furnishes the clue. It was the anemic, "salt-sick" cattle that first pointed to the deficiency of the gray sandy soils of Florida.

Similarly, it was the almost complete absence of tooth decay in Deaf Smith County, Texas, which led to the discovery that the cereals and vegetables grown on the rich, unleached soils of the county contained several times the usual amount of phosphorus and other minerals. Deaf Smith County, it is important to note, is in the southern part of the fertile chernozem soil belt that stretches from the Texas panhandle north through Oklahoma, Kansas, Nebraska, South and North Dakota. It is the largest single area of chernozem soils in the world and, as a national asset, worth incomparably more than all the gold stored at Fort Knox.

Again, it was the curious behavior of the "pining" cattle in a certain district of New Zealand, so like that of the sheep of the South Australia coastlands, which were said to be suffering from "coastiness," and also like that of the cows in some of Michigan's northern counties which led ultimately to the discovery that the soil in all these widely separated areas was deficient in cobalt. The discovery has saved cattle and sheep raisers hundreds of thousands of dollars annually, for the cure is simple beyond belief. A cobalt-deficient pasture can be made to support healthy stock if

it is given as little as 28 ounces per acre of cobaltous sulfate.

Step by step the Cornell scientists and their collaborators are diagnosing the more important soil deficiences and prescribing effective remedies. For example, it has for some time been possible to diagnose—and prevent, with a few pounds of boron per acre—the internal cork of apples, the top rot of tobacco, the cracked stem of celery, the internal browning of cauliflower, the heart rot and dry rot of beets.

By applying minute quantities of zinc, Florida and Texas orchardists are preventing citrus mottled leaf and pecan rosette. By small additions of magnesium to the fertilizer the potato farmers of Maine, Long Island, and New Jersey have prevented chlorosis of the leaf and thereby raised bigger and more dependable annual crops. In Virginia and elsewhere the correction of magnesium deficiency has prevented the "sand drown" of tobacco.

To what extent are these soil and animal deficiencies passed on to human beings through their consumption of mineral-deficient foods? Again, the question can be answered only in terms of broad approximations and probabilities. Doubtless the situation would be much more serious but for the fact that the American diet, except at the lowest income level, is relatively varied and is ordinarily derived from widely distributed areas of agricultural production.

This is particularly true with respect to urban food consumers. Their supplies of fresh fruits and vegetables may and doubtless do vary greatly in point of both mineral and vitamin content. But the law of averages ordinarily prevents the development of acute deficiencies. Some staples, such as wheat flour, are deliberately mixed and averaged by the processor before they enter the market. As Prof. Albrecht has shown, the protein content of wheat rises from county to county as we go west in the state of Kansas, depending upon the thickness and nearness to the surface of the underlying lime stratum. The thiamin (vitamin B1) content of wheat also varies greatly depending both upon the variety and upon the soil and climate conditions under which it is grown. But before this wheat reaches the consumer in the form of flour the product of many farms in widely separated growing areas has been mixed, so that what the consumer ordinarily gets in terms of flour and bread is neither very bad nor very good.

Since white flour is largely robbed of the normal wheat content of some 20 known mineral and vitamin nutrients it wasn't good enough to satisfy the Food and Nutrition Board of the National

Research Council; hence the "enrichment" program which restored four of these nutrients in synthetic form—but only four. Whether this wartime makeshift should be consolidated in our postwar nutrition policy is a question which is still being hotly debated. Dr. Albrecht is one of many highly qualified food scientists who think it's not good enough.

In general, it may be said that the scientists who know most about it are genuinely and openly worried about what the uncertain and declining fertility of our soils may have done to the nutritional quality of our food supply, especially in the great cities of our Eastern seaboard.

"It is entirely probable," writes Dr. Kenneth Beeson, a member of the staff of the Cornell laboratory, "that the value of a minimum diet of protective foods may be reduced significantly below the minimum requirements through the use of inferior foods. . . . The problem is intensified because of the location of our large cities and of our truck farms that supply these cities with food. Most of our large cities are located on the well-leached podzols and podzolic soils that are acid in reaction and low in the bases. The truck farms are of necessity located near the cities on the same soils, and large quantities of truck crops and fruits are shipped to these cities from localities where nutritional disorders, due to mineral deficiencies in the soils have been noted in both humans and animals."

In many of his writings Dr. Albrecht goes much farther than this. With research dentists like Dr. Weston A. Price and anthropologists like Prof. Ernest A. Hooton of Harvard, the Missouri soil chemist sees an actual process of degeneration taking place in the American population as a result of a decline in soil fertility.

"Diseases," he writes, "are astoundingly on the increase. They are also on the relative increase. Hay fever, unknown to the Indian, has doubled its percentage of the population in 25 years. Heart disease, according to the New York City Health Department, took 203 per 100,000 in 1907, but 327 in 1936, a 60 per cent increase in almost 20 years. Arthritis is on the increase. Cancer is on the increase. Dental caries is on the increase."

One must ge to England to hear an equally ominous warning. British agronomists, among them the defiantly unorthodox but admittedly able Sir Albert Howard, differ sharply with Professor Albrecht in their interpretation of the chemistry and biology of the soil-plant-animal relationship. They agree, however, that there is such a relationsl ip

and that the neglect of soil fertility imperils the health and survival of human beings and human societies. And in England they have made common cause with a distinguished advance guard of the medical profession.

In 1939 a group of some 600 British provincial doctors — the "panel" physicians of the County Palatinate of Cheshire — made medical history by proclaiming in an extraordinary "Medical Testament" that

"Nutrition and the quality of food are the paramount factors in fitness. No health campaign can succeed unless the materials of which the bodies are built are sound. At present they are not. Probably half our work is wasted, since our patients are so fed from the cradle, indeed from before the cradle, that they are certain contributions to a C3 (sickly and below par) nation. Even our country people share the white bread, tinned salmon, dried milk regimen. Against this the labors of the doctor resemble those of Sisyphus. . . . We conceive it to be our duty in the present state of knowledge to point out that much, perhaps most of this sickness would be prevented by the right feeding of our people. . . ."

Significantly, the chief present activity of this highly influential medical committee—the equivalent of one of our county medical societies—is the publication of a "News Letter on Soil Compost" which hammers continuously on the thesis that the health of the British people depends finally upon the health and fertility of the British soils. Last February the committee supported — in vain, incidentally — a motion in the House of Lords which would have instructed the Royal Commission appointed to investigate the trend of the British birthrate, to study as well "the relation between the vitality of man and the vitality of soil on which he feeds."

Before the outbreak of this war the Health Committee of the League of Nations was already contemplating studies of this sort. When peace comes and the already organized Agricultural and Food Committee of the United Nations gets down to work it is to be hoped the investigation of the soil-plant-human relationship will not be neglected. For the problem is not confined to England or America. It affects all countries and all peoples, and it may not safely be ignored or minimized.

Trends in Pasture Improving Methods

Condensed from The Ayrshire Digest

Fred V. Grau

Extension Agronomist, State College, Pennsylvania

With the improvement of forage crops figuring so prominently in the period which lies ahead, it is significant at this time to note the trends or changes which are taking place in pasture improvement. It is pertinent because through forage crops such a large proportion of the total digestible nutrients for livestock can and are being produced on the farm at the lowest possible cost.

Ten years ago the improvement of permanent pastures consisted almost solely of surface applications of lime, superphosphate, and manure and waiting two to three years for results. Today this program is still basic but with these changes:

1. Renovation, consisting of discing the materials into the soil and sowing an adapted mixture of seeds which provide pasture in two months instead of two years. Fall discing and fertilizing is considered best, with the seeds sown on the honeycombed soil in late winter.

2. Fall applications are now specifically recommended instead of at the farmer's convenience. Results are better, labor is better distributed, the spring rush is eased, soil is firmer for machinery, fertilizer manufacturers and dealers are better pleased at a more equitable distribution of their labor and transportation.

3. Heavier applications of fertilizer have been found to be good business. Light applications of 250 to 300 lbs. frequently resulted in no improvement because of high soil fixation of nutrient elements. Applications of 600 to 800 lbs. to the acre are not uncommon now.

4. Nitrogen is being used in greater amounts and to a greater advantage, either in 1-1-1 ratios or as straight goods on soils known to be well-supplied with calcium, phosphorus and potash from previous treatments. Only a portion of the acreage is so treated each year to provide *earlier* pasture.

5. Reduced acreage of bluegrass pasture treated to avoid having more grass in May and June than livestock can utilize. White clover cannot withstand heavy, tall growth of bluegrass.

6. More supplementary or

Reprinted by permission from The Ayrshire Digest, Brandon, Vermont, April, 1945

cropland pasture is being provided to furnish adequate, continuous supplies of pasture for the livestock, especially in July and August.

Supplementary or Cropland Pasture

Until about 1937-38 most of the grazing on cropland consisted of pasturing second growth timothy-clover fields. This was a necessity but a nuisance until the electric fence became popular. Grazing the second growth ruined many badly needed clover seed crops and often failed to provide the continuous supply of pasture desired because of the lack of drought tolerance. Sudan grass partially filled the gap but never gained great popularity, probably because of the cost of preparing and seeding and the ever-present danger of prussic acid poisoning. Many farmers continued to barn-feed or to cut soybeans green to haul in to the stock when bluegrass pastures failed.

Triple-Purpose Pastures

Today in Pennsylvania many leading dairymen are relying on the high-producing Triple-Purpose pasture for adequate *mid-summer* grazing.

By 'Triple-Purpose,' I mean a system in which mixtures composed of drought-tolerant, high-yielding hay species are sown on fertile cropland primarily to furnish abundant mid-summer pasture. Any excess forage may be cut for high-quality hay or silage. Outstanding examples are orchard grass-Ladino clover mixtures and bromegress - alfalfa mixtures. Triple-Purpose pastures are distinguished from bluegrass pasture or native pastures which normally furnish only limited grazing in spring and fall, and which furnish only low yields of hay or silage of doubtful quality.

Essentially, the Triple-Purpose pasture consists of Ladino clover with a strong-growing drought-tolerant hay-type grass such as orchard grass, bromegrass, Alta fescue, or tall oatgrass. Timothy with some adapted hay legume such as alfalfa, red clover or alsike clover is usually added to the mixture to aid in the ease of mowing and curing the first, early-cut crop for hay or grass silage.

Triple-Purpose Plant Line-Up

The development of the Triple-Purpose pasture may be read in the brief accounts of the various grasses and legumes which follow:

Ladino clover. In 1935 there was one field of this legume known to be growing successfully in Bucks County. In 1938 a few small fields had been established on a trial basis. No records of any seed sales by local dealers

could be obtained until 1940. By 1943 enough seed had been brought into Pennsylvania to seed 100,000 acres. The popularity of this legume for dairy pasture, beef, sheep, hog and poultry pastures seems to be deserved. Orchardists prefer it for permanent sod in apple orchards.

Orchard grass. First attempts in 1936 to encourage its use for pasture met with a wave of protest based on prejudice against the "clump" nature of the grass. Continued education on its virtue of drought-tolerance, plus its apparent successful "compatibility" with Ladino clover, began to win converts among leading dairymen.

Smooth bromegrass. Long considered unadapted to Pennsylvania on the basis of a few early trials, bromegrass was not seeded in quantity until about 1942 when southern-grown strains became available and appeared to be better adapted than northern-grown seed. Considerable quantities have been seeded but judgment is being reserved as to its limitations.

Alta fescue. A favorite in Oregon and parts of the Middle West, Alta fescue was introduced and made a part of the original Triple-Purpose mixture in 1942. Since then, good practice has indicated that it be substituted for orchard grass on *wet* sites.

Reed Canary grass. Used on wet sites in a minor way but increasing in popularity.

Tall oatgrass. Since about 1941 it has become an increasingly popular Triple-Purpose grass in southeastern Pennsylvania and is slowly spreading on the drier, thinner soils.

Ryegrass. First used as a winter cover on a vegetable farm in Philadelphia County in 1935, it has been used extensively as a cover crop in row crops and to some extent for late fall pasture to rest the more permanent sods. It is recommended in pasture seedings which are made without a companion crop.

Birdsfoot Trefoil. Not a part of the Triple-Purpose plan but it is showing promise for *permanent* sods on non-tillable land for pasture and hay. Acreage is limited to small test fields but the trend is upward. It was scarcely known in the State until about 1935. First demonstration seedings were made in 1940.

Alfalfa. Grazing alfalfa-grass mixtures is showing an upward trend as knowledge is gained in grazing management. New wilt-resistant strains, the use of heavier amounts of phosphorus and potash, and in some cases, borax, will increase the popularity of alfalfa for pasture.

Pasture Managmeent Trends

In the permanent pasture system the trend is toward smaller acreages of improved sods, more livestock units to the acre, more mowing to keep the vegetation fresh and succulent and to control weeds, and toward more scattering of droppings to promote uniform grazing.

In the Triple-Purpose system, management tends mostly toward one early cutting for hay or grass silage, followed by controlled alternate grazing for the rest of the season. It is usual practice to graze 16 head to the acre for seven days, then rest the pasture for 21 days. Grazing the herd for two hours after each milking, then turning them into a resting lot or into a convenient permanent pasture where water and shade are available, is an increasingly popular practice. In this method the cows are not allowed to lie down and to soil the grass on rising.

A trend is noted in that the first cut for hay is made on some farms at a height of about four inches. This leaves a heavy protective cover on the soil, on which the hay cures better, which promotes more rapid recovery, and which tends to discourage close grazing which is detrimental to the Ladino clover and to the alfalfa.

Threshing the second-cutting of hay made from Ladino-grass mixtures for legume seed is showing an upward trend. The threshed hay retains high feeding value and the seed is a "bonus."

Another trend has been noted in the last two years where the first cutting of two-year-old sods is allowed to mature grass seed which is harvested as a seed crop, after which the cows are turned in to pasture. In some cases the field is clipped after grass seed harvest and the straw put up as rough hay and bedding.

Fertilization trends are toward heavier applications of 0-1-1 ratios made annually in the fall at the close of the grazing season to more nearly restore the nutrient elements removed in the crop. A good Triple-Purpose pasture may remove from the soil in one season approximately 50 lbs. of phosphorus (P_2O_5) and 100 lbs. of potash (K_2O).

The most significant trend in pasture improvement is the gradual disappearance of the distinction between "pasture" and "hay." Developments indicate a tendency to devote more acreage to corn and grass and less to small grains. The grass acreage on cropland can then be devoted to any one of the three major phases of Grassland Farming (hay, pasture, silage) as is dictated by conditions and equipment.

Improved strains of forage crops through plant breeding is a significant trend. It is logical to predict that a farmer may have two or even three types of grass-legume mixtures which mature at different times, the better to distribute his labor and lessen the chance of losing a hay crop by adverse weather. In this way, the aftermath used for pasture becomes available on a staggered schedule which increases the flexibility. The variety tends to increase intake of roughage.

Last, but not least, there is a tendency for pasture to be recognized officially as a farm crop with a definite cash value. The avoidance of this recognition has done much to retard pasture improvement.

Soil Management in Young Orchards

Condensed from New England Homestead

Lawrence Southwick
Massachusetts State College

In the past, the soil management program in young orchards in New England has often resulted in poor tree performance or has given rise to serious losses from soil erosion. Despite the undeniable fact that many orchard projects were developed satisfactorily, numerous others proved to be only snares and delusions and consequently proved very costly. Today, it is quite generally understood that fruit trees cannot profitably be planted just anywhere and then left to shift for themselves. Trees, as well as other crop plants, require a decently good soil properly fertilized and well managed.

It is rather important to consider the preparation of land for planting an orchard although this is not as vital with fruit trees perhaps as for vegetable or forage crops. However, the growth that a newly-planted tree makes during the first few years in the orchard may be especially significant and this important initial growth depends to a large extent on the immediate ability of the tree to obtain the requisite nutrients and moisture from the soil. If the soil is water-logged, shallow, low in organic matter and nutrients, or droughty, or if competition from grass sod, weeds, or cover-crop is excessive, the newly-planted tree will often just struggle along, keeping alive but making little new root or shoot growth. Such trees often fall victim to the egg-laying ravages of the pestiferous buffalo tree-hop-

Reprinted by permission from the New England Homestead, Springfield, Mass.

per, which seems to prefer slow-growing young trees in which to lay its eggs. The damage caused to the bark of affected trees may be extensive and the scars become obvious to any casual observer. These injuries further decrease vigor and affected trees are often liabilities rather than assets. Of course, trees will grow out of this trouble under proper nutritional and soil management practices. Even so, it is much more difficult to train such trees, due principally to the failure of the leaders to grow sufficiently to keep pace with the laterals. Good growth the first few years is a goal to be sought with diligence. Not only will subsequent training and pruning be simpler, but profitable size and actual fruiting will be obtained earlier. In addition, more uniform orchard blocks result when trees start off and continue to grow satisfactorily. Orchards composed of trees of variable size and vigor due to growing conditions are usually not profitable orchards.

Soil management thus begins before the orchard is planted. A soil that is deep, well-drained yet retentive of moisture, well supplied with organic matter, and is in good tilth and well prepared for planting will help immensely in getting a newly-planted orchard off to a good start.

Subsequent soil management practices may be of equal importance, since trees well started should continue to grow thriftily. Apple trees planted directly in sod have done fairly well in some instances, but poor growth is the more likely result. Sod, particularly close to the small tree, robs the tree of nitrogen, other nutrients, and water. Naturally, under such conditions, the tree suffers unless growing conditions are especially favorable. Hence, if planting is done in fields or meadows without disturbing the sod, a circular area at least 4 feet in diameter around each tree should be hoed or otherwise kept free of all growth of grass or weeds. This necessitates either turning the sod over or removing it after shaking out the soil. Incidentally, it is important to place good top soil around the tree roots when setting the trees. The use of fertilizer is not advisable and may do more harm than good.

Sometimes an orchardist has staked out a new orchard and then proceeded to place a forkful of hay on each tree location. This is done the summer previous to planting so that the hay mulch will settle down and suppress the growth of grass prior to setting the trees. This practice not only kills out the sod in the small area where the tree is to be planted but thereby improves the physical condition of the soil and actually adds plant nutrients leached from the hay. A tree planted

under such conditions is much more likely to grow satisfactorily than one planted directly in sod.

It used to be the accepted practice to cultivate young orchards and today this method of soil management is still in wide use, particularly in southern New England and with peaches. There is little question concerning the value of cultivation in releasing plant nutrients to tree roots or concerning the favorable response of young trees to cultivation with or without annual cover crops. Under this system, innumerable orchards have been started very successfully. But there is another consideration which has not received full cognizance until more or less recently and that is soil erosion. Under clean cultivation or even cultivation with annual cover cropping, the annual losses from sheet and gully erosion are more serious than usually realized. This is particularly true on our New England slopes and hillsides. And erosion can be severe not only on steep grades but on gradual slopes that at first glance would indicate no danger from this trouble. It is not uncommon to find a stonewall across the lower edge of a field practically covered up with top soil. Often it is impossible to see the wall from the field. In such cases, there may be three or more feet of fine, dark top soil on the field side of the wall. And, of course, this eroded material came from the field above which in some cases has suffered such losses as to be infertile and unproductive. Every farmer should do his utmost to lessen and to control such erosion on his land. Serious losses of top soil are irreplaceable.

To avoid dangers of erosion, newly-planted orchards may be strip-cultivated. Usually tree rows along the slope are cultivated and the areas between the rows left in sod. This gives certain advantages of cultivation to the trees without running the risk of disastrous soil erosion. The cultivated strips along the rows may be up to 8 or 10 feet wide depending on planting distances and other factors. Occasionally, such a system results in some erosion along the strips unless they are level or on the contour. If water occasionally comes down non-level cultivated strips, sod areas should be left at frequent intervals to interrupt the flow. Of course, planting on the contour is the modern method of controlling erosion where cultivation is practiced and is advisable under some conditions. With orchards permanently maintained in sod or sod plus mulch, erosion is not a factor and contouring is generally not called for.

As soon as feasible, it is usually good policy to seed down a cultivated orchard and to depend

thereafter for thrifty growth on mulches or fertilizers or both. A young orchard in a properly-fertilized and limed sod (high magnesium lime is recommended) can be mulched adequately around the trees with the grass produced right in the orchard. Of course, in a mature orchard where the soil is rather thoroughly exploited by the tree roots and the branches shade most of the surface, the supply of mulch in the orchard itself falls below the required amount and additional material from the outside must be brought in. Mulching as a system of soil management for orchards is definitely on the increase. And it is suitable for young trees as well as for bearing orchards.

Gestation Periods of Five Breeds of Cattle

Condensed from The Cattleman

E. A. Livesay and Ural G. Bee
West Virginia University in Journal of Animal Science

For a long period cattle breeders have considered the average gestation period of all breeds of cattle to be in the neighborhood of 283 days. Jay L. Lush (1937) made a study of 27,810 gestations and found the average to be 282.1 days, which is close to the generally accepted average. David C. Rife, *et al.* (1943) reported a marked difference in the gestation periods of Hereford and Aberdeen-Angus cows maintained in the Ohio Experiment Station herds. The gestation periods of the same cows when cross-bred were approximately half way between. The Hereford cows when mated to a Hereford bull had an average gestation period of 289.0 days; the Aberdeen-Angus cows when mated to Aberdeen-Angus bulls had an average of 272.8 days; and when cross-breeding was practiced in both the Hereford and Aberdeen-Angus cows had an average of 281.4 days.

The West Virginia workers assumed that such variations were indications that the gestation period varied in accordance with earliness of maturity among breeds and is a heritable variation. Therefore, a study was made of the breeding records of the college herds at West Virginia University. If a difference exists in the gestation period, based on early and late maturity, it was felt that breeds such as the Jersey and Holstein Friesian would give the results to prove or disprove such an assumption.

Reprinted by permission from The Cattleman, Fort Worth, Texas

GESTATION PERIODS OF TWO BREEDS OF BEEF CATTLE AND THREE BREEDS OF DAIRY CATTLE

	Both Sexes		Males		Females	
Breed	No.	Av. No. Days	No.	Av. No. Days	No.	Av. No. Days
Aberdeen-Angus	173	282.5	79	282.7	94	282.2
Hereford	174	285.2	90	285.0	84	285.2
Jersey	265	277.9	141	278.6	124	277.2
Ayrshire	580	277.8	283	278.1	297	277.5
Holstein	415	278.3	213	278.7	202	277.7

The data in the accompanying table were summarized from the breeding records of the Animal Husbandry and Dairy Husbandry Departments. The records extended over a period of fifteen years.

The records in the table show an average gestation period of 282.5 days for the Aberdeen-Angus and 285.2 for the Hereford breed, the period being longer by 2.7 days for the Hereford breed. This difference is highly significant.

The records show an average gestation period of 277.9 days for the Jersey, 277.8 days for the Ayrshire, and 278.3 for the Holstein Friesian breed. The average days for the gestation period of each of these three dairy breeds do not vary significantly and hence any assumption that an early maturing breed, such as the Jersey, might have a shorter gestation period has no foundation.

The most interesting thing about the gestation period, as revealed by these breeding records, is that it is 5.8 days shorter in the dairy breeds than in the beef breeds. This figure represents the difference between the average of the gestation period of the two beef breeds and the average period of the three dairy breeds. An analysis of variance showed that the difference between the means of the gestation periods of the beef and dairy breeds was highly significant.

The table also shows the number of male and female calves and the average of their respective gestation periods. These divisions are given for information, which may interest those who still hold that male calves have a slightly longer gestation period than females, or vice versa.

The breeding records of the Aberdeen-Angus and Hereford Herds at West Virginia University do not reveal the wide difference (16.2 days) between the gestation period of these two beef breeds as found at the Ohio Experiment Station. The difference in these breeds was 2.7 days. This difference, however, was highly significant.

Potato Seed Determines the Production Possibilities

Condensed from Pennsylvania Farmer

O. D. Burke

THAT "good" potato seed pays in increased stands, vigor of plants and increased yields is an established fact accepted by most growers. The question is "what is good seed?" Is certified seed "good" seed or what comprises good seed?

Characters that should be found in "good" potato seed are productiveness, disease resistance in locally adapted varieties, economy of planting and an attractive appearance. Productiveness depends on the amount of disease present, on how the seed was stored, and the size of the seed.

The amount of disease present can be determined only during the growing period, since no index can be made by inspecting the tubers themselves. Many of the virus (degenerative) diseases show no outward symptoms on the tubers. Inspection of the crop the year before it is used as seed by a recognized authority gives a fair index of its relative virus freedom, provided the crop is grown in an area that has proved adapted to seed production. A reading taken on the tubers themselves by growing representative samples under southern conditions during the winter is an even better index of disease freedom. Certification groups do the first of these steps in most instances and in some instances the second. Growers that want the highest production possible will demand both "guarantees" of disease freedom.

The question as to how much of the virus diseases can be tolerated is a difficult one to answer. However, enough data has been collected by experiment station workers to partially answer this question. One worker shows that for leaf roll, rugose mosaic and spindle tuber, 4 per cent disease may reduce yields by 2 to 3 per cent, 20 per cent disease by 12 to 15 per cent, 30 per cent disease by 20 or more per cent, and when all are diseased reductions as high as 84 per cent are common. These figures emphasize the need for seed with a very low virus count.

So far the discussion has been confined to the degeneration diseases, but far more dangerous diseases may be purchased in poor seed. Fusarium wilt, scab,

Reprinted by permission from Pennsylvania Farmer, Pittsburgh, Penna., Mar. 24, 1945

rhizoctonia and ring-rot are seed-borne diseases. Since scab and rhizoctonia are more influenced by soil management than by the presence of their casual organisms on the seed planted, their presence may well be disregarded. Fusarium wilt reduces both stand and quality of the crop and a tolerance of less than one per cent should be found in "good" seed.

Bacterial ring-rot is today's menace to the potato crop. Research has shown that when only a few tubers are affected in a harvested field, a loss of one to two per cent is common in the next crop and 15 to 20 per cent is not uncommon the second year. "Good" seed then must be ring-rot free, but unfortunately ring-rot has become established in many seed growing areas. Certification should stand for ring-rot freedom, but again unfortunately inspectors have occasionally failed to find ring-rot presence usually due to overwork during this war period. Certification workers are doing their best to guarantee ring-rot freedom and on the whole are doing a good job. Nine out of ten lots of certified seed have remained ring-rot free during 1944.

From the disease freedom viewpoint, certified potato seed is most likely to be "good" seed, but may occasionally fail. Often seed home grown but one year removed from certified seed is "good" seed, and where "roguing" is practiced in the field may be "good" seed through a long period of years when grown in the northern mountain counties in Pennsylvania. This is especially true when the seed crop is grown in an isolated spot well away from other diseased potatoes.

Manner of seed storage affects the yielding possibilities of the planted crop. When potatoes are stored under warm conditions, diseases such as late blight rot, Fusarium dry rot, ring-rot, silver scurf and even rhizoctonia progress rapidly. Affected tubers lose moisture rapidly and much of the stored starch may be used by disease-causing fungi. When temperatures are allowed to reach 50° F. or higher during the winter, rapid use of oxygen in deep piles or closed containers (bins, cars, etc.) results in the physiological disease "black-heart." Also, sprouting starts early, resulting in a weakened or unhealthy condition and a lowered food supply for the young growing plant results. Good seed should come through storage in a firm condition, not weakened by the effects of disease, and with the sprouts just showing. Completely dormant seed (not showing evidence of sprouting) often takes so long to come up that rotting of sprouts and seed piece

occur as a result of the attacks of soil organisms.

The size of seed has been stressed to show the difference between whole and cut seed. Many workers have contended in the past that small whole seed is more likely to be from diseased hills. This might be true if "roguing" were not a part of the seed growing practice, but with "roguing" most hills of this type are removed. It is only those that take disease before the "rogues" are removed and which do not show symptoms in the current year that are carrying disease to the table stock grower. There is considerable evidence that such plants produce larger tubers than their healthy neighbors. The small uncut size of seed then should have less virus disease than that which must be cut and should have bigger production possibilities. Cut seed also offers an open surface for the inroads of soil fungi and bacteria that often rot them, thus lowering stands and reducing yields. Good seed may be cut seed, but from the virus disease control viewpoint and from the soil rotting viewpoint, uncut whole tubers are better. Where seed is used that has not been rogued, small sized tubers will include all of the virus diseased hills and, therefore, will carry higher disease counts than the larger ones from the same field.

Many new potato varieties have been named in the last decade, as a result of potato breeding research by the United States Department of Agriculture and experiment station workers. In many of these new varieties, resistance to one or more diseases has been combined with good appearance and high yielding properties. Resistance to virus diseases, to common scab and to late blight can now be found in at least one variety already named. Unfortunately not all these characters have been secured in a single variety. When one of these diseases is causing a grower loss, then "good" seed will be of a variety with a high degree of resistance to that particular disease.

Potato seed constitutes one of the costlier items in the potato growing enterprise. Disease-free seed must be sold for more than ordinary table stock, since seed growing involves many practices such as tuber uniting for foundation seed stock, roguing, planting in isolation, and others that are costly. The grower cannot afford to buy anything except the best, but this best should go as far as possible. Potato growers are showing a preference for small size tubers since there is an economy in planting and a decided effect on field stand. Misshapen tubers with knobs and

second growth represent a waste of time in cutting.

Potato growers like other purchasers "buy with the eyes." Clean shapely tubers "take their eye" and influence their belief in seed value of a certain stock.

However, in "good" seed potatoes we must face the facts. Potatoes of any variety possess the same identical characters and transmit them (through cuttings or "eyes") to their offspring. Differences in size, shape, skin texture, and irregularities of growth, such as knobs and cracks, in no way influence seed value. Productivity is not influenced by appearance and if care has been taken to assure disease freedom, a crop with poor appearance may be the best of seed for that particular variety, but seed growers must realize "eye appeal" is a factor to the purchaser of "good" seed.

Lamb Pastures

Condensed from Sheep Breeder

THE most modern and by far the most economical method of growing out the early lamb on high priced lands is by the use of forage pastures, such as fall sown rye, spring sown peas and oats, rape and soy beans or cow peas. This means that although the lambs may come early they, with their mothers, are soon put upon pastures that have been particularly prepared for them. Thus the rye, which has been sown the previous fall, can be left to mature into grain after they have fed on it several weeks. This will leave them ready to go on rape which has been sown as soon as the ground can be worked. At the same time that the rape was planted a mixture of field peas and oats should be sown which will furnish pasture in the early summer. Under these conditions the ewe gives a plentiful supply of milk and the lamb moreover secures green feed to such as extent that much grain is saved. By this method it is possible to move the sheep every ten days to new pasture, thus practically eliminating the danger from stomach worm. In experiments conducted at the Illinois Experiment Station this method was found to produce larger lambs in less time, for less cost and commanding a higher market price. While this requires more labor in the preparation of crops than pasturing on blue grass, yet the amount of grain produced per acre is greater than under any other system, and

Reprinted by permission from the Sheep Breeder, Chicago, Illinois, April, 1945

there is no danger from stomach worms.

After lambing it is customary to have the sheep sheared. This should be done before the hot weather is on and yet should not be done so early as to subject the shorn ewes to severe changes in the temperature. In other words, shearing could be done about the time of the last killing frost or two or three weeks before corn planting. There is usually someone in the neighborhood who makes a specialty of shearing, and as the charge is not prohibitive considering the present price of wool, it is better to have an experienced man to do the work. The sheep should not be shorn upon the ground, but upon a clean floor, and the fleece rolled up with the flesh side out and tied with paper twine or white grocer's twine if the other is not available. Never use binder twine as it reduces the value of your wool ten per cent.

Ten days to two weeks following shearing the sheep should be dipped to dispose of ticks and to reduce to a minimum the possibilities of sheep scab. But dipping shortly after shearing less dip is needed and the weather is such as not to chill the sheep nor yet so hot as to be sultry. Choose the morning of a clear, warm, quiet day so that the sheep will be dry before night. Dip all the sheep the same day and spray the inside of the barn, thus killing all parasites. If the sheep have been badly bothered with ticks they should be dipped again between three and four weeks later.

Sulfa Drug Immunizes Peach Trees

Condensed from Report of Progress

A SULFA drug, formerly used in treatment of certain human diseases, has been found to render young peach trees immune to X-disease, a serious threat to the peach industry. The discovery was made by E. M. Stoddard, plant pathologist at the Connecticut Agricultural Experiment Station.

The drug, known in scientific circles by the high-sounding name, *p*-aminobenzenesulfanilamide, gave 100 per cent control of X-disease when injected into seedling peach trees in the greenhouse, two weeks after the trees had been artificially inoculated with the virus that causes the disease. Trees treated in 1943 are still healthy and those treated in 1944 have no sign of the disease four months after injections.

Results when trees were injected with the sulfa drug *before* inoculation with the X-disease

Reprinted from the Report of Progress, Connecticut Agricultural Experiment Station, New Haven, Conn., Dec. 22, 1944

virus were somewhat less successful. Control was only 70 or 80 percent here. Other materials, including another sulfa compound, have been found to give a considerable degree of control, but *p*-aminobenzenesulfanilamide gave the best results.

p-Aminobenzenesulfanilamide unfortunately will cause some injury to the trees. However, Mr. Stoddard has found that the use of 2 per cent maltose or dextrose (sugars) with the sulfa drug, antidotes the injurious effect to a large extent. These sugar substances in no way decrease the effect of the sulfanilamide on the X-disease virus. Another material, *p*-aminobenzoic acid, when added to the sulfanilamide, was found to antidote its beneficial effect and had no effect on the virus.

X-disease was first discovered in Connecticut in 1933 by Mr. Stoddard. It first affects the leaves of the peach trees, causing them to become dry and brittle and irregular patches of the blade to fall out. The fruit usually shrivels and falls on the diseased part of the tree soon after the leaf symptoms appear. In mild cases, where the fruit remains on the branches, it ripens prematurely and has a bitter flavor. Since its discovery 11 years ago, X-disease has spread rapidly until today it appears throughout the entire northern United States, seriously reducing production in many places.

Mr. Stoddard points out that his work is still in the experimental stage and its practical application has not yet been worked out. However, his discovery opens up the field of control of virus diseases of plants by chemotherapy and may lead to the common application of this method in the future.

Useful Weed

Of the 300,000 different varieties of plants, man makes use of only a mere handful. Gradually, however, science is expanding the list. Latest addition is the Southwest's creosote bush, which grows wild on dry range land.

From it is being extracted a white, crystalline compound chemists call nor-di-hydroguairetic acid. Its use: to preserve the sweet flavor of foods containing animal or vegetable fats.

Already the USDA, which has found this acid non-toxic, has approved its use in lard, and it may soon be used in preventing rancid lard from reaching fighters overseas. It may do much to expand the regular market for lard, too.

Known as N.D.G.A., the chemical was discovered and developed at the University of Minnesota.

—*Farm Journal*

Phenothiazine Boosts Steer Gains

Condensed from American Hereford Journal

M. Glen Kirkpatrick

STEERS on pasture getting phenothiazine and salt (1 to 10 by weight) outgained steers getting plain salt last summer and the summer before on a farm at Ashland, O., where an intensive test has been conducted during the past two years.

The steers used in this test were Herefords from the Texas Panhandle. Those used the first summer were grade animals, while purebreds were used the second summer.

During the first summer, the steers getting phenothiazine and salt gained 20.5 pounds more per head than the salt steers. Their pasture season was 113 days (June to Oct. 1). During the second summer the phenothiazine-salt steers gained 15.3 pounds more per head than those on plain salt. The pasture season the second summer was 31 days longer (May 23 to Oct. 13).

Translate these gains into phenothiazine and they mean that each pound of the drug consumed the first summer gave a return of 60 pounds of beef. The second summer the return was 30 pounds of beef for each pound of phenothiazine consumed. Average of the two seasons was 45 pounds of beef for each pound of the drug consumed by the steers.

When you put the dollar sign on those returns, you find that each dollar spent for phenothiazine eaten by the grade Herefords the first summer, the steers paid back $6.09 in increased weight gains. The second summer the purebred Herefords paid back $3.38 for each dollar spent for phenothiazine. Average of the two seasons was $4.46 paid back for each dollar's worth of phenothiazine eaten.

The steers that were used in this experiment did not carry a heavy load of worms and none of them showed any evidence of parasitic disease. This was determined in both seasons by making worm-egg counts. The first year egg counts were made every two weeks. The second year only two egg counts were made (one at the beginning of the trials and another eight weeks later) because of lack of help. Eggs of seven different kinds of cattle worms were found in the manure.

The egg count in both lots decreased during the pasture season, but the decrease was much

greater in the steers getting phenothiazine and salt than in the steers getting salt alone. It is possible that if the steers had been heavily parasitized the results would have shown even more favorable returns from the use of phenothiazine, for the phenothiazine was consumed at a rate (4 to 5 grams per head daily) considered adequate for control of several of the most injurious cattle parasites. Consumption of phenothiazine was heavier in early summer when the pasture was more succulent.

There were 54 Hereford steers used in this experiment. The first season there were 25, which were divided into two groups—12 in one and 13 in the other. The steers were weighed individually at the start and divided as evenly as possible on the basis of weight and condition. They were placed in adjoining fields, with similar pasture conditions in each field. The pasture was a mixture of bluegrass and white clover. Steers were weighed every two weeks, during the time they were on test.

The second year there were 29 animals. These were divided into lots of 14 and 15, and the average weight per head was exactly the same in both groups. The fields were reversed the second season; that is, the steers getting phenothiazine and salt grazed in the field used by steers getting only salt the season before.

Value of Treatment Shown by Test

From these results it is apparent that the phenothiazine-salt method of controlling worms in beef cattle (or dairy animals not milking) should prove valuable wherever the animals voluntarily eat enough of the mixture.

This work was carried on by Dr. Paul D. Harwood, who discovered the value of phenothiazine in the U. S. Bureau of Animal Industry in 1938. Dr. Harwood comments on the results of the Ohio work as follows:

"Every farmer can easily determine whether or not his own cattle will consume enough of the phenothiazine-salt mixture to remove their parasites. Cattle should take 3 ounces of the 1 to 10 mixture for each 100 pounds of live weight in a space of two

Results in 1943

	Initial Wt. Per Head	Total Gain	Gain Per Head
Salt alone (12 head)	632.2	712	59.33
Phenothiazine-salt (13 head)	629.5	1,038	79.85

Results in 1944

Salt alone (15 head)	588.3	2,229	148.6
Phenothiazine-salt (14 head)	588.3	2,294	163.8

weeks. For example a farmer owns a herd of beef cattle which weigh a total of 6,000 pounds. Then 6,000 divided by 100 and multiplied by three, equals 180 ounces. Divide 180 by 16 and the result is 11.25 pounds.

"Therefore, this farmer should mix one pound of phenothiazine with 10 pounds of ground salt and place the mixture before the cattle when they are not salt hungry. The test should be carried out when the pasturage is lush and growing rapidly because at this time of year the cattle eat most salt. The animals will be wormed if 11 pounds of the mixture are consumed in 14 days or less.

"A warning must be given. Do not place phenothiazine-salt mixtures where dairy cattle in production may reach them. The metabolized products of phenothiazine may be excreted in the milk of treated animals, and this milk may turn pink upon exposure to air. Such milk is generally considered unfit for human consumption.

"However, the worst effects of parasitism may be observed in young animals. Therefore, the dairyman who raises his own replacements may find phenothiazine-salt mixtures useful for the protection of his young stock that is not yet in production.

"Phenothiazine is easily given to beef cattle in salt. The mixture should be placed where it is protected from sun and rain. In the Ohio experiments a strongly built salt-box was placed in the pastures. A flimsy box would be quickly destroyed when cattle rub themselves against it. The box should be faced away from prevailing winds, and its contents should be protected by a roof."

Crossline Pigs Show Promise

Crossline pigs, obtained by crossing purebred inbred lines, give promise of being highly efficient pork producers. In tests at the Iowa Experiment Station, 60 litters of crossline pigs excelled uncrossed purebreds, sired by the same boars, in size of litters, gains in weight and survival of the pigs to 5 months of age. Crossline litters contained, on the average, 1.8 more pigs when they were 5 months old. . . . The Iowa crossline swine-breeding research parallels the method used in developing hybrid corn.

—B.A.I., USDA

Does Farm Forestry Pay?

Condensed from The Southern Planter

Harold Grogan and B. M. Arington

FARMERS and others have long debated the question: "Does farm forestry pay?" John A. Blakemore, operator of a 200-acre dairy farm in Washington County, Virginia says, "Yes, it does pay." He has learned from personal experience that the farm woodland is a valuable part of the total farm enterprise and that it deserves much more attention than it ordinarily receives. His facts and figures prove it.

Although only 29 acres of the Blakemore farm is used for growing timber, the woodland is well cared for and is being steadily developed into a producing unit which compares favorably, acre for acre, with the best pasture land on the farm. In the past, it has been subjected to light grazing but even that practice is being discontinued because the owner is now convinced that stock interfere with maximum yield of forest products. He made this decision even though additional pasture is needed and must be rented.

Chestnut trees were plentiful in the original stand of timber but they were eventually all killed by the chestnut blight. These dead trees were salvaged in 1933, and 208,000 board feet of chestnut logs and acidwood were sold. Fifty-two thousand feet of oak were sold at the same time and the sale netted the owner $1,596.

The Blakemore farm was approved as a TVA unit-test demonstration in 1935, but little or no attention was given the woodland until 1943, when the owner decided that the demonstration could not be complete until his timber crop was included. With the help of the county agent and a TVA forester, the woodland was inventoried and a simple management plan prepared. This plan recommended, among other things, the harvesting of 92,500 board feet of hickory, gum and oak from trees which were mature or defective and which could not be expected to contribute much to future growth.

Such trees were marked and sold on the stump to the Southwest Virginia Lumber Company for $925, or $10 per thousand board feet. The buyer did a good job of logging. He cut everything that was marked with the exception of a few cull trees re-

Reprinted by permission from The Southern Planter, Governor Street, Richmond, Va.

served by the owner for fuelwood. His loggers were experienced men, and very few unmarked trees were damaged. The remaining stand looks so good that owner and buyer both feel justifiable pride in their accomplishment.

In spite of the fact that 352,500 board feet of timber have been harvested from this 29-acre woodland since 1933, it still bears no resemblance to run-of-the-mine cut-over tracts. A cruise following the last cutting shows a present volume of 186,400 board feet, an average per acre volume of almost 6,280 board feet. The poplars, walnuts and oaks making up the bulk of this remaining stand are beautifully formed, healthy trees in the prime of life. Many of them will produce three 16-foot logs, some even four.

On 24 acres the average growth of the remaining trees is 545 board feet per acre per year. On the remaining five acres the volume is less and growth is only 357 board feet per acre per year. This means that the entire woodland is producing new wood at the rate of 14,865 board feet each year. At $10 stumpage, part of the woodland then is making an annual capital gain of $5.45 per acre, which is pretty good income from a crop requiring no plowing, cultivation, or fertilization.

It is true that Mr. Blakemore has almost ideal conditions for growing trees. The soil is good and a large part of the woodland is located on a north slope where there is plenty of moisture. Most of his success, however, is due to the fact that he harvests his timber only as it becomes ripe. He strives always for increased growth on the better trees. The results speak for themselves. Farm forestry does pay on the Blakemore farm.

Vaccinate for Protection

Condensed from American Poultry Journal

Dr. Cliff D. Carpenter

It is clear that vaccines and other biological products should be used as preventive agents whenever there is danger that the diseases which they are designed to prevent may suddenly strike and cause serious losses. By the same token, if it is *known* that there is no such hazard—then they are not needed.

Too frequently, many flock owners, especially after experiencing a loss the year before from, say, an outbreak of fowl pox, vaccinate their pullets for a year or two or maybe more, and then *neglect to continue* this important practice. It is the writer's belief that if you do not have an outbreak of fowl pox over a period of 15 years (during which time you have not vaccinated)—but during the 16th year, your layers become infected with this virus disease—it is probable that your financial loss would be greater than the cost of a 15-year preventive vaccination program. This has been proved many times.

The virus that causes fowl pox is very resistant, and scabs from the affected parts of the skin, which will fall off when the disease has run its course, have been found to contain live virus many months afterward. Sparrows and other wild birds inhabiting our farms are susceptible to the same disease and, in addition, may carry the virus mechanically from one farm to another.

This means then, that *if you have once had fowl pox on your farm, or if, last year, the disease was present in your county or community, there is every good reason to decide now that you will vaccinate this year's pullets and not take a chance.* The cost is trifling, the technique of vaccination uncomplicated.

It should be pointed out, however, that the vaccine contains the same live virus that causes natural outbreaks of the disease, and must be handled carefully. Further, manufacturer's directions should be followed carefully.

Vaccinating the pullets, which should be done between the ages of 8 and 12 weeks, causes only a very minor set-back. Some pullets may be off feed for 3 or 4 days, and attention should be

Reprinted by permission from the American Poultry Journal, Chicago, Ill., April, 1945

given them, especially 8 to 12 days following vaccination, when the resulting "take" is most prominent. If the birds are not eating well, a damp mash fed at noon for a few days will be of assistance. Other aids include liquid or dried skim milk and dried cheese whey.

Only healthy pullets should be vaccinated. Those suffering from colds, coccidiosis or worm infestations should be vaccinated after they are back on the road to health.

If the pullets or hens are laying and it is necessary to protect them from fowl pox by vaccination, use pigeon-strain fowl pox vaccine instead of the usual chicken strain. Pigeons have their own strain of pox virus, and it produces a less severe reaction on chickens than the chicken strain. Manufacturers have perfected a pigeon-strain fowl pox vaccine which is capable of giving the birds reasonably prompt protection without throwing them off egg production. Obviously, it is important, too, that layers are handled carefully to avoid an unnecessary loss of eggs.

While scientists are of the opinion there is a specific turkey strain of fowl pox, yet turkeys are equally susceptible to the chicken strain of the disease, and frequently it is essential that turkeys, too, be vaccinated. It should be pointed out, that, contrary to the case in chickens, a single vaccination with a fully potent chicken strain fowl pox vaccine will *not* give permanent protection to turkeys as it does in chickens. If, therefore, half-grown turkeys are vaccinated, and later some of them are retained for the production of hatching eggs or for breeding stock, they should be revaccinated with chicken strain fowl pox vaccine at from 6 to 8 months of age.

There is no satisfactory individual treatment for fowl pox in either chickens or turkeys after the disease has made its appearance. Affected birds should be removed from the flock, and special attention given to feeding practices that will encourage normal eating. Since the mouth and eye lesions (cankers) of fowl pox, that frequently accompany the skin infection, interfere with eating and vision, these cankers should be removed and the areas treated with straight tincture of iodine. This local treatment should be repeated at 24 to 48 hour intervals until the cankers stop forming.

Since both infected birds, when they recover, and vaccinated pullets may spread the disease for several weeks or months following either infection or vaccination, such birds should not be allowed to range with, or be housed with, unvaccinated birds.

Laryngotracheitis

Laryngotracheitis is another virus disease. Here again the virus itself is not capable of killing the birds—except by mechanical means. A few days after susceptible birds become infected, symptoms of gasping for breath are evident. The virus attacks the mucous membrane of the larynx (voice organ) and the upper part of the trachea (windpipe), resulting in the production of comparatively large quantities of mucus. Air passing over this mucus causes a rather typical gurgling or rasping sound. In serious cases, of course, the mucus may be present in sufficient quantity to cause severe choking, frequently resulting in strangulation. When laryngotracheitis vaccine is applied to the mucous membranes of the vent, the vaccinated area becomes highly inflamde 4 to 5 days following application. A few days later (less than a week), properly vaccinated birds are immune to the disease.

As with fowl pox, 'tracheitis vaccine contains the live, fully potent virus of the disease and, if carelessly handled, may cause death from artificial infection—before the vaccine has had an opportunity to protect the bird.

Although layers should be carefully handled, they can be successfully vaccinated with little interruption in laying. Unless, however, birds are vaccinated in the very early stages of the disease, it will be of very little value to vaccinate infected pens.

In heavy producing broiler areas 'tracheitis vaccination is a regular practice by most growers. In the heavily populated, commercial poultry producing sections of the Eastern, Rocky Mountain and Pacific Coast States, vaccination against 'tracheitis is commonly practiced. In the Midwest, however, this disease has not yet reached epidemic proportions in some states. It should be pointed out, therefore, that when an outbreak of 'tracheitis is suspected, an accurate and prompt diagnosis by a qualified person should be made—before vaccination is employed.

While properly vaccinated birds will not spread the disease to susceptible birds (except for a few days following vaccination), it is important to realize fully that improperly vaccinated birds, and those that have recovered from a natural outbreak, may carry and spread the disease to other susceptibles for months. Therefore, if 'tracheitis vaccination is begun, it should become an annual practice with each succeeding crop of pullets—at least for several years, and certainly as long as the disease is known to exist in the community.

Anemia in Pigs Can Be Checked

Condensed from American Hampshire Herdsman

Anemia is a pig killer. It often strikes in the spring when the little pigs are from 3 to 6 weeks old and least able to defend themselves. It isn't always limited to young pigs, however.

While anemia is one of the easiest pig diseases to fight, it still cuts down pork production every year. With more pork needed this year, the fight should be increased on all farms.

How Pigs Act

Most farmers know what anemia looks like. The pig loses his appetite, lacks vigor, may develop jerky breathing for "thumps". As the disease progresses the pig gets a wrinkled skin and a rough coat. Sudden death often results.

Lack of iron and copper is the chief cause of anemia. The sow's milk is a very poor blood builder, and unless the pig has access to other sources of iron and copper there is always danger of the disease.

The cure is simple—provide the needed iron and copper in the ration. Pigs on clean dirt lots or pasture usually will get the required amounts from rooting in the dirt or eating grass. Confined pigs, especially in a central hog house must be provided other sources.

Paint Sow's Udder

The best way of preventing the disease in suckling pigs is to paint the sow's udder daily with a solution containing iron and copper. A good mixture is 3½ ounces of ferric sulphate, ⅛ ounce copper sulfate, 1 pint water and 1 pint sugar or corn sirup. As the pigs grow older, this solution can be sprinkled over a couple of shovels full of clean dirt and placed in the pen, or it can be added to the pigs' starting ration.

If the farmer has skimmilk, he may want to add 1/10 pound of ferric sulfate or ferric citrate to 100 pounds of milk trough-fed in a creep. Increasing the amount of iron and copper in the sow's ration will not prevent anemia in pigs.

Reprinted by permission from American Hampshire Herdsman, Peoria, Illinois

FOR THE FARMER'S LIBRARY

These books are recommended as outstanding in their field:

A Living from Bees — By Frank C. Pellett, Field Editor of American Bee Journal. Orange Judd Publishing Co., Inc. (1943). $2.00.

America's Garden Book — By Louise Bush-Brown and James Bush-Brown. Charles Scribner's Sons (1939). $3.50.

An Agricultural Testament—By Sir Albert Howard, C.I.E., M.A., former Director, Institute of Plant Industry, Indore. Oxford University Press. $3.50.

Animal Sanitation and Disease Control—By Dr. R. R. Dykstra, Dean of the School of Veterinary Medicine, Kansas State College. The Interstate Printers and Publishers. $2.85.

Beef Cattle — By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Sons, Inc. $4.00.

Beef Cattle Production in the South—By D. W. Williams, Head, Department of Animal Husbandry, A. & M. College of Texas, College Station, Texas. The Interstate Printers & Publishers (1941). $2.00.

Breeds of Livestock in America—By Henry W. Vaughan, formerly Prof. of Animal Husbandry, Iowa State Coll., Univ. of Minn., Mont. State Univ. College Book Company. $3.75.

Dairy Cattle Feeding and Management — Third Edition — By H. O. Henderson, Professor of Dairy Husbandry, West Virginia University. 1st Edition by Carl W. Larson, Pres. Bryant & Chapman Co., and Fred S. Putney, late Professor of Experimental Dairy Husbandry, Penn. State College.
Publishers: John Wiley & Sons, Inc. (3rd Printing July, 1944).
557 pages. $4.00.

Dairy Science — By W. E. Petersen, Ph.D., Assoc. Prof. and Assoc. Dairy Husbandryman, Univ. of Minn. Edited by R. W. Gregory. J. B. Lippincott Company (1939). $4.00.

Diseases and Parasites of Poultry — By Edgar Hugh Barger, D.V.M., Berkeley, Calif., and L. E. Card, Ph.D., Prof. of Poultry Husbandry, Univ. of Illinois. Lea & Febiger. 3rd Edition (1943). $3.75.

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, Cornell Univ. Morrison Press. $5.00.

Farm Management—By Robert R. Hudelson. The Macmillan Co. $2.00.

Farm Management and Marketing — By V. B. Hart, M. C. Bond, L. C. Cunningham, all of N. Y. State College of Agriculture, Cornell University. Publishers: John Wiley & Sons, Inc. (1942). $2.75.

Farm Records — By John A. Hopkins, Ph.D., Asso. Prof. of Economics, Iowa State College. Iowa State College Press. $2.50.

Forestry in Farm Management—By R. H. Westveld and Ralph H. Peck. John Wiley & Sons, Inc. (1941). $3.00.

Growing Tree and Small Fruits—By H. B. Knapp, Director, State Institute of Applied Agriculture, Farmingdale, Long Island, N. Y., and E. C. Auchter, Chief, Bureau of Plant Industry, U. S. D. A. John Wiley & Sons. $2.75.

Grow Your Own Fruit—By M. G. Kains, formerly with U. S. Dept. of Agriculture; Professor of Horticulture, Pennsylvania State College. Charles Scribner's Sons. $3.50.

How to Raise Rabbits for Food and Fur — By Frank G. Ashbrook, Fish and Wildlife Service, U. S. Dept. of the Interior. Orange Judd Publishing Co., Inc. (1943). $2.00.

Judging Dairy Cattle—By Edwin S. Harrison, Professor of Animal Husbandry, Cornell University. John Wiley and Sons, Inc. $2.75.

Livestock Production—By Walter H. Peters, Chief of the Division of Animal and Poultry Husbandry, Univ. of Minn. McGraw-Hill Book Co., Inc. $3.50.

Livestock Judging Handbook — By Julius E. Nordby and W. Malcolm Beeson, Ph.D., Asst. Professors Animal Husb., Univ. Idaho. The Interstate Printers. $2.60.

Modern Agricultural Mathematics — By Maurice Nadler, B.S., A.M. Dept. of Mathematics, Newtown High School, Long Island. Orange Judd Publishing Co., Inc. (1942). $2.00.

Modern Farmers' Cyclopedia of Agriculture—By Earley Vernon Wilcox, Ph.D., Agricultural Writer, formerly with U. S. Dept. of Agriculture. Orange Judd Publishing Co., Inc. (1944). $4.50.

Natural Principles of Land Use—By Edward H. Graham,, Chief of the Biology Division of the Soil Conservation Service. Oxford University Press. 275 pages. $3.50.

Poultry—By A. R. Winter, Asst. Prof. Poultry Husbandry, Ohio State Univ., and E. M. Funk, Asst. Prof. Poultry Husbandry, Mo. State Univ. J. B. Lippincott Co. $5.00.

Practical Farming for the South — By Benjamin F. Bullock, now Prof. of Rural Education, Atlanta University, Atlanta, Georgia. Univ. of North Carolina Press. $2.50.

Profitable Poultry Keeping — By H. Clyde Knandel, Prof. and Head, Dept. of Poultry Husb., Penn State College. Orange Judd Publishing Co., Inc. $3.00.

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. The Macmillan Co. $3.75.

Repairing Farm Machinery—By Ivan G. Morrison, Asst. Professor Agri. Education, Purdue University. The Interstate Printers & Publishers. $1.80.

Roots in the Earth—The Small Farmer Looks Ahead — By P. Alston Waring and Walter Magnes Teller. Harper & Bros. $2.50.

Sheep Production—By Levi Jackson Horlacher, B.S.A., M.A., Asst. to Dean, Col. Ag. Univ. Ky. McGraw-Hill Book Co., Inc. $4.00.

Soil Conservation — By Hugh Hammond Bennett, Chief, Soil Conservation Service, U. S. Department of Agriculture. McGraw-Hill Book Company, Inc. $6.00.

Some Common Diseases of Cattle—By George R. Conn, B.S.A.H., D.V.M. Orange Judd Publishing Co., Inc. (1942). $1.50.

Successful Poultry Management — By Morley A. Jull, Professor and Head of Poultry Dept., University of Maryland. McGraw-Hill Book Company. $3.00.

The American Land—Its History and Its Uses — By William R. Van Dersal, biologist in the United States Department of Agriculture. Oxford University Press. $3.75.

The Farm Primer—By Walter Magnes Teller, formerly with the Farm Security Administration, U. S. D. A. David McKay Co. $2.50.

For the convenience of our readers, books listed may be purchased through this Department. Address Farmers Digest, Ambler, Pa.

INDEX

Beef Cattle

What Type of Feeding Will Pay?..Oct., 1944
Performance or Show Ring Qualities Nov., 1944
Cattle in the Pines .....Nov., 1944
More Beef from Fewer Cattle .....Nov., 1944
Beef Cattle Do Better on Silage....Dec., 1944
Size Is Important.....Dec., 1944
Coarse Roughage for Cattle.....Jan., 1945
Grass Fed Steers Make Most Money Jan., 1945
Cattle Like "Suiter's Grass".....Feb., 1945
Finish Young Steers with Grass and Grain, Feb., 1945
The Story of Meat .....Feb., 1945
Need of Efficiency .....Mar., 1945
Dark Beef .....April, 1945
What is Type? .....April, 1945
Breeding of Charollais Cattle .....April, 1945
Grow Your Own Feed.....May, 1945

Conservation

Rebuilding Eroded Soil is a Slow Process, Aug.-Sept., 1944
Water Spreading on Range Land...Oct., 1944
It's Producing War Food and Feed..Oct., 1944
Man with a Bull-Tongue Scooter...Nov., 1944
Taking Our Soils for Granted.....Nov., 1944
Soils Take a Rest.....Dec., 1944
Undercover Farming .....Dec., 1944
From Poverty Grass to Alfalfa.....Jan., 1945
Didn't Plow Sod Land .....Jan., 1945
Sods for Soil Improvement .....Feb., 1945
Terracing for Fun .....Feb., 1945
Reed Canary Grass in Gully Control..Feb., 1945
Equipment Adapted to Contour Farming, Feb., 1945
Your Land Belongs to Tomorrow...Mar., 1945
Take Care of the Range and the Profits Take Care of Themselves.....April, 1945

Crops

Grass Seed Fortunes for the Harvesting, Oct., 1944
The Caley Pea—Sensation in the Deep South .....Nov., 1944
The Gamble Is Out of Brome.....Nov., 1944
Home Grown Clover Seed.....Nov., 1944
Our "Chinese" Food (Rice).....Nov., 1944
Ruban Clover a Four-Way Crop...Dec., 1944
What's New in Alfalfa.....Dec., 1944
Undercover Farming .....Dec., 1944
Hoeing Cotton with Fire .....Jan., 1945
Guar, Summer Growing Legume in Arizona, Jan., 1945
Didn't Plow Sod Land .....Jan., 1945
Sweet Potato Culture .....Feb., 1945
Sprouted Soybeans Save Feed.....Feb., 1945
Ladino Clover .....Mar., 1945
Giant Blue Panic Grass .....Mar., 1945
Blue Lupine, a Valuable Legume...Mar., 1945
Alfalfa $8 a Ton .....May, 1945
Save Labor in Corn Growing .....May, 1945

Dairy Cattle

Good Feeding for Efficient Performance, July, 1944
What Is a Good Herd Average?....Oct., 1944
Injuries That Cause Udder Troubles..Dec., 1944
Cows Can't Synthesize Minerals ...Dec., 1944
Control of Lice on Cattle.....Dec., 1944
How Cattle Digest Their Feed.....Dec., 1944
Shall I Inbreed?.....Jan., 1945
Herd Replacements .....Jan., 1945
Ration Book for Cows .....Jan., 1945
Building a Disease-Free Herd.....Jan., 1945
Nutritional Control of Milk Fever ..Feb., 1945
Calf Pills—A New Feed .....Feb., 1945
Feeding Moldy Silage .....Mar., 1945
Pastures and Roughage.....Mar., 1945
To Strip or Not to Strip.....Mar., 1945
Urea as a Substtiute for Protein...Mar., 1945
Winter Dysentery Penalizes Milk Production, Mar., 1945
The Triangle of Animal Life.....April, 1945
Dry Dock for Cows .....April, 1945
Bang's Disease Control .....April, 1945
How to Select a Sire .....April, 1945
Research in Dairy Husbandry at Ithaca, April, 1945
Saving Feed and Labor .....May, 1945
What It Costs to Raise a Heifer....May, 1945
Modern Trends in Dairy Cattle Nutrition, May, 1945
Self-Service for Calves .....May, 1945
Inheritance Must Be Supplemented..May, 1945

Farm Machinery

Rental Charges for Machinery.....July, 1944
Substitutes for Dairy Help ..Aug.-Sept., 1944
The Self-Propelled Combine .....Oct., 1944
Electric Fence—Convenience or Hazard, Oct., 1944
Electricity Unloads the Corn Wagon..Nov., 1944
Care of Milking Machines.....Feb., 1945
A "Sure Enough" Push Button Barn Cleaner, Mar., 1945
New Land Clearing Machine.....Mar., 1945
Machine Co-op .....April, 1945
Protects Metal from Rust .....April, 1945
Tractors Cut Corn Costs.....May, 1945

Fruit

Magnesium for Apple Trees.....July, 1944
Boom in the Tung Belt.....Aug.-Sept., 1944
The Farmer Must "Mobilize" the Soil, Mar., 1944
Pole Thinning of Peaches.....Nov., 1944
Florida Has First Lychee Orchard..Dec., 1944
Speed Sprayer Is Labor Saver.....Dec., 1944
Reducing Apple Drop with Harvest Sprays, Jan., 1945
Controlling Field Mice in Orchards..Jan., 1945
New Varieties of Small Fruits .....Feb., 1945
Methods of Speeding Apple Picking..Feb., 1945
Thinning of Peaches .....May, 1945

Fertilizers

Humus Carries the Ball.....Aug.-Sept., 1944
Improved Fertility Saves Water, Aug.-Sept., 1944
Fertilizing To Make Water Go Further, Oct., 1944
The Precious Things of the Earth..Oct., 1944
Secrets of Soil Organisms.....Oct., 1944
Mightier Than the Mower.....Oct., 1944
Double-Quick Fertility .....May, 1945
Balance in Plant Nutrition .....May, 1945
Know Your Phosphates .....May, 1945
Liming the Land .....May, 1945

INDEX

Deep vs. Shallow Tillage ..... Nov., 1944
Soils Take a Rest ..... Dec., 1944
Fertilizing for Big Yields ..... Dec., 1944
Danger in Improper Use of Fertilizers, Jan., 1945
Soil Fertility, Food Source ..... Feb., 1945
Humus, Working Partner of Plant Food, Feb., 1945
Cornstalks to the Rescue ..... Mar., 1945
Fertilizer Makes Farm Acre Larger . Mar., 1945
How Long Do Effects from Fertilizers Last, April, 1945
Farm Manure as a Fertilizer ..... April, 1945

Hay

Forced Ventilation Method of Curing Hay, May, 1944
Beating a Hay Shortage ..... June, 1944
Mow Curing of Hay ..... June, 1944
Curing Hay on Tripods ..... Aug.-Sept., 1944
Hubam Clover a Four-Way Crop ... Dec., 1944
Sweet Sudan in the Pasture Program May, 1945

Hogs

Hybrid Pigs ..... Aug.-Sept., 1944
Swine Project Speeds Improvement . Oct., 1944
The ABC's of Sanitation ..... Dec., 1944
The Post-War Pig ..... Dec., 1944
Is Self-Feeding of Brood Sows Possible, Dec., 1944
More Pork at Less Cost ..... Jan., 1945
Conditioning Bred Sows Sensibly ... Feb., 1945
Hogs, Artichokes and Power ..... Feb., 1945
More Meat—Less Lard on the Post-War Hog, Mar., 1945
Rye Pasture for Pigs ..... Mar., 1945
Breeding for Efficient Gains ..... Mar., 1945
Round Worms of Swine ..... April, 1945
Feet and Legs ..... April, 1945
Tilt the House, Save More Pigs .... May, 1945
Grow Your Own Feeds ..... May, 1945

Horses

The Horse and the Law ..... Aug.-Sept., 1944
"Alkali Reserve" and Staying Power in Horses ..... Nov., 1944
Columbus Took a Chance ..... Dec., 1944
What Kind of Horses Do We Need? Feb., 1945

Pastures

Good Pasture Means Greater Income, Aug.-Sept., 1944
Pasture Poisoning ..... Oct., 1944
Green Pastures ..... Oct., 1944
Coarse Roughage for Cattle ..... Jan., 1945
New Pasture from Rock ..... Jan., 1945
Cattle Like "Suiter's Grass" ..... Feb., 1945
Good Pasture Management ..... Feb., 1945
Pasture with a Punch ..... Mar., 1945
To Expand the Roughage Supply . April, 1945
Sweet Sudan in the Pasture Program May, 1945

Poultry

Facts About Vaccinating Poultry, Aug.-Sept., 1944
Pigeons for Profit ..... July, 1944
Feeding Tricks ..... Oct., 1944
Efficiency Solves His Labor Problems Oct., 1944
He Knew What He Was Doing .... Oct., 1944
Lime Those Poultry Droppings .... Nov., 1944
Daughters Are a Key to Progeny Testing, Oct., 1944
Three Ways to Figure Flock Averages, Nov., 1944
A Simplified Breeding Program .... Dec., 1944
Pigeon Heroes ..... Dec., 1944
5,000 Turkeys on One Acre ..... Dec., 1944
Which Range System? ..... Jan., 1945
Handling Poultry Manure ..... Jan., 1945
Improved Broiler Feathering ..... Feb., 1945
All Pullet Flocks May Be Post-War Necessity Mar., 1945
Dressed Poultry ..... Mar., 1945
Early Hatching Pullets Pay ..... Mar., 1945
Spotlight on Vitamin D ..... Mar., 1945
Fiber and Bulk in Poultry Rations . Mar., 1945
Prevent Cannibalism with Manure . Mar., 1945
Meet the Situation ..... April, 1945
The "Why and How" of Crossbreeding, April, 1945
One-Man Poultry Farm ..... April, 1945
Poults Are Blind ..... May, 1945
Steps Take Time ..... May, 1945
Raising Geese at Ark Farm ..... May, 1945

Sheep

Fitting Sheep for Sales ..... Nov., 1944
Grainless Lamb Production ..... Nov., 1944
Sheep Pregnancy Disease ..... Nov., 1944
What is a Ram? ..... Dec., 1944
Some Facts About Feeding ..... Jan., 1945
Raising Sheep on Poor Feed ..... Feb., 1945
Pheno-Thiazine Salt Mixture ..... April, 1945
Good Sheep Don't Die in Debt ..... April, 1945
The Montadale—A New Breed ..... May, 1945

Forestry

White Pine Protected from Disease . July, 1944
Chemistry on a Sawdust Trail ..... Nov., 1944

Weeds

Nebraska's War on Weeds ..... July, 1944
Beat the Weeds for More Bushels, Aug.-Sept., 1944
"2-4-D," the New Weed Killer ..... Mar., 1945
Stop, Look and Question! ..... Mar., 1945

Vegetables

Mulch and Hill ..... June, 1944
Root-Knot Can Be Controlled ..... Nov., 1944
Custom Potato Spraying ..... Dec., 1944
Fertilizing for Big Yields ..... Dec., 1944
Air Transport for Certain Crops ... May, 1945
"Any Fool Can Grow Tomatoes" ... May, 1945
Yam Drying Comes of Age ..... May, 1945

Miscellaneous

Ice Well Satisfactory ..... Jan., 1945
Experiment Station Goes to Farm . Jan., 1945
Soldiers Wield Both Sword and Plowshare, Jan., 1945
Give 'Em Air (Barn Ventilation) ... Jan., 1945
Tenant-Purchase Program ..... Feb., 1945
160 Square Rods ..... Feb., 1945
Tomorrow's Farm at Today's Prices . Feb., 1945
Which Farm Lease Shall I Use? ... Mar., 1945
Urea as a Substitute for Protein .. Mar., 1945
How to Start a Car in Cold Weather . Mar., 1945
Earthworm Culture ..... Mar., 1945
Firesafe, Labor-saving Livestock Compound, April, 1945
Why Control Prices? ..... April, 1945
Hints for Trapping Muskrats ..... April, 1945
Meet Sporovibrio desulfuricans .... April, 1945
Electric Wire Fence ..... April, 1945
Air Transport for Certain Crops .... May, 1945
That Rascal, the Crow ..... May, 1945
A Farmer Looks at Alaska ..... May, 1945

SOIL CONSERVATION BULLETINS

Soil Erosion a National Menace—Circular 33—25c

What is Soil Erosion—Misc. Publication—15c

To Hold This Soil—Misc. Pub. 321—45c

The Land in Flood Control—Misc. Pub. 331—10c

Conservation Farming Practices and Flood Control—Misc. Pub. 253—10c

Influences of Vegetation and Watershed Treatments on Runoff, Silting and Stream Flow—Misc. Pub. 397—15c

Soil Depleting, Soil Conserving and Soil Building Crops—Leaflet 165—5c

Cover Crops for Soil Conservation — Farmers Bulletin 1758—5c

Strip Cropping for Soil Conservation — Farmers Bulletin 1776—5c

Terracing for Soil and Water Conservation—Farmers Bulletin 1789—10c

Prevention and Control of Gullies — Farmers Bulletin 1813—10c

Terrace Outlets and Farm Drainageways—Farmers Bulletin 1814—10c

Erosion on Roads and Adjacent Lands—Leaflet 164—5c

Soil Conservation Districts for Erosion Control—Misc. Pub. 293—10c

Working Plans for Permanent Farms—Misc. Pub. 411—15c

Soil Conservation Survey Handbook—Misc. Pub. 352—20c

A Method of Estimating the Economic Effects of Planned Conservation on an Individual Farm — Misc. Pub. 463—10c

Soils and Men—1938 Yearbook of the United States Department of Agriculture—$1.75

Any of the above literature may be purchased by name and number directly from the Superintendent of Documents, Washington, D. C.

INDEX

Deep vs. Shallow Tillage ..... Nov., 1944
Soils Take a Rest ..... Dec., 1944
Fertilizing for Big Yields ..... Dec., 1944
Danger in Improper Use of Fertilizers, Jan., 1945
Soil Fertility, Food Source ..... Feb., 1945
Humus, Working Partner of Plant Food, Feb., 1945
Cornstalks to the Rescue ..... Mar., 1945
Fertilizer Makes Farm Acre Larger Mar., 1945
How Long Do Effects from Fertilizers Last, April, 1945
Farm Manure as a Fertilizer ..... April, 1945

Hay

Forced Ventilation Method of Curing Hay, May, 1944
Beating a Hay Shortage ..... June, 1944
Mow Curing of Hay ..... June, 1944
Curing Hay on Tripods ..... Aug.-Sept., 1944
Hubam Clover a Four-Way Crop ... Dec., 1944
Sweet Sudan in the Pasture Program May, 1945

Hogs

Hybrid Pigs ..... Aug.-Sept., 1944
Swine Project Speeds Improvement Oct., 1944
The ABC's of Sanitation ..... Dec., 1944
The Post-War Pig ..... Dec., 1944
Is Self-Feeding of Brood Sows Possible, Dec., 1944
More Pork at Less Cost ..... Jan., 1945
Conditioning Bred Sows Sensibly ... Feb., 1945
Hogs, Artichokes and Power ..... Feb., 1945
More Meat—Less Lard on the Post-War Hog, Mar., 1945
Rye Pasture for Pigs ..... Mar., 1945
Breeding for Efficient Gains ..... Mar., 1945
Round Worms of Swine ..... April, 1945
Feet and Legs ..... April, 1945
Tilt the House, Save More Pigs .... May, 1945
Grow Your Own Feeds ..... May, 1945

Horses

The Horse and the Law .... Aug.-Sept., 1944
"Alkali Reserve" and Staying Power in Horses ..... Nov., 1944
Columbus Took a Chance ..... Dec., 1944
What Kind of Horses Do We Need? Feb., 1945

Pastures

Good Pasture Means Greater Income, Aug.-Sept., 1944
Pasture Poisoning ..... Oct., 1944
Green Pastures ..... Oct., 1944
Coarse Roughage for Cattle ..... Jan., 1945
New Pasture from Rock ..... Jan., 1945
Cattle Like "Suiter's Grass" ..... Feb., 1945
Good Pasture Management ..... Feb., 1945
Pasture with a Punch ..... Mar., 1945
To Expand the Roughage Supply .. April, 1945
Sweet Sudan in the Pasture Program May, 1945

Poultry

Facts About Vaccinating Poultry, Aug.-Sept., 1944
Pigeons for Profit ..... July, 1944
Feeding Tricks ..... Oct., 1944
Efficiency Solves His Labor Problems Oct., 1944
He Knew What He Was Doing .... Oct., 1944
Lime Those Poultry Droppings .... Nov., 1944
Daughters Are a Key to Progeny Testing, Oct., 1944
Three Ways to Figure Flock Averages, Nov., 1944
A Simplified Breeding Program .... Dec., 1944
Pigeon Heroes ..... Dec., 1944
5,000 Turkeys on One Acre ..... Dec., 1944
Which Range System? ..... Jan., 1945
Handling Poultry Manure ..... Jan., 1945
Improved Broiler Feathering ..... Feb., 1945
All Pullet Flocks May Be Post-War Necessity Mar., 1945
Dressed Poultry ..... Mar., 1945
Early Hatching Pullets Pay ..... Mar., 1945
Spotlight on Vitamin D ..... Mar., 1945
Fiber and Bulk in Poultry Rations .. Mar., 1945
Prevent Cannibalism with Manure .. Mar., 1945
Meet the Situation ..... April, 1945
The "Why and How" of Crossbreeding, April, 1945
One-Man Poultry Farm ..... April, 1945
Poults Are Blind ..... May, 1945
Steps Take Time ..... May, 1945
Raising Geese at Ark Farm ..... May, 1945

Sheep

Fitting Sheep for Sales ..... Nov., 1944
Grainless Lamb Production ..... Nov., 1944
Sheep Pregnancy Disease ..... Nov., 1944
What is a Ram? ..... Dec., 1944
Some Facts About Feeding ..... Jan., 1945
Raising Sheep on Poor Feed ..... Feb., 1945
Pheno-Thiazine Salt Mixture ..... April, 1945
Good Sheep Don't Die in Debt .... April, 1945
The Montadale—A New Breed ..... May, 1945

Forestry

White Pine Protected from Disease July, 1944
Chemistry on a Sawdust Trail ..... Nov., 1944

Weeds

Nebraska's War on Weeds ..... July, 1944
Beat the Weeds for More Bushels, Aug.-Sept., 1944
"2-4-D," the New Weed Killer ..... Mar., 1945
Stop, Look and Question! ..... Mar., 1945

Vegetables

Mulch and Hill ..... June, 1944
Root-Knot Can Be Controlled ..... Nov., 1944
Custom Potato Spraying ..... Dec., 1944
Fertilizing for Big Yields ..... Dec., 1944
Air Transport for Certain Crops ... May, 1945
"Any Fool Can Grow Tomatoes" ... May, 1945
Yam Drying Comes of Age ..... May, 1945

Miscellaneous

Ice Well Satisfactory ..... Jan., 1945
Experiment Station Goes to Farm .. Jan., 1945
Soldiers Wield Both Sword and Plowshare, Jan., 1945
Give 'Em Air (Barn Ventilation) ... Jan., 1945
Tenant-Purchase Program ..... Feb., 1945
160 Square Rods ..... Feb., 1945
Tomorrow's Farm at Today's Prices Feb., 1945
Which Farm Lease Shall I Use? ... Mar., 1945
Urea as a Substitute for Protein .. Mar., 1945
How to Start a Car in Cold Weather Mar., 1945
Earthworm Culture ..... Mar., 1945
Firesafe, Labor-saving Livestock Compound, April, 1945
Why Control Prices? ..... April, 1945
Hints for Trapping Muskrats ..... April, 1945
Meet Sporovibrio desulfuricans ..... April, 1945
Electric Wire Fence ..... April, 1945
Air Transport for Certain Crops ... May, 1945
That Rascal, the Crow ..... May, 1945
A Farmer Looks at Alaska ..... May, 1945

SOIL CONSERVATION BULLETINS

Soil Erosion a National Menace—Circular 33—25c

What is Soil Erosion—Misc. Publication—15c

To Hold This Soil—Misc. Pub. 321—45c

The Land in Flood Control—Misc. Pub. 331—10c

Conservation Farming Practices and Flood Control—Misc. Pub. 253—10c

Influences of Vegetation and Watershed Treatments on Runoff, Silting and Stream Flow—Misc. Pub. 397—15c

Soil Depleting, Soil Conserving and Soil Building Crops—Leaflet 165—5c

Cover Crops for Soil Conservation — Farmers Bulletin 1758—5c

Strip Cropping for Soil Conservation — Farmers Bulletin 1776—5c

Terracing for Soil and Water Conservation—Farmers Bulletin 1789—10c

Prevention and Control of Gullies — Farmers Bulletin 1813—10c

Terrace Outlets and Farm Drainageways—Farmers Bulletin 1814—10c

Erosion on Roads and Adjacent Lands—Leaflet 164—5c

Soil Conservation Districts for Erosion Control—Misc. Pub. 293—10c

Working Plans for Permanent Farms—Misc. Pub. 411—15c

Soil Conservation Survey Handbook—Misc. Pub. 352—20c

A Method of Estimating the Economic Effects of Planned Conservation on an Individual Farm — Misc. Pub. 463—10c

Soils and Men—1938 Yearbook of the United States Department of Agriculture—$1.75

Any of the above literature may be purchased by name and number directly from the Superintendent of Documents, Washington, D. C.

ARE YOU KEEPING UP—

Keep up with the latest developments in your field? Here's a group of magazines that specialize in a particular subject! You'll be interested in at least one of these magazines . . . and you have the assurance that the articles are written by people who know. Send in your subscriptions today!

	Per Year
Farming	
Farmer's Digest, monthly	$2.00
The Country Book, quarterly	1.00
Market (Truck) Growers Journal	1.00
Horses	
Rider & Driver, monthly, horses for sport and pleasure	3.50
The Horse, bi-monthly	5.00
Thoroughbred (Horse) Record, weekly	4.00
Spokesman and Harness World, monthly	1.00
Bee Magazines	
Beekeeper's Item	1.00
American Bee Journal	1.00
Livestock	
Berkshire (Hog) News, monthly	1.00
Chester White World, m.	1.00
American Cattle Producer	1.00
Southeastern Cattleman	1.00
Coastal Cattleman, monthly	1.00
Pacific Stockman, monthly	1.00
The Sheepman	1.00
Arizona Stockman, monthly	1.50
Plantation Stockman, monthly	2.00
Pigeons	
American Pigeon Journal, squab-fancy	1.50
Pigeon News, fancy only	1.50
Poultry	
Progressive Poultryman, m.	1.00
Cackle & Crow, The Poultry-paper	1.00
Pacific Poultryman	.50
Northeastern Poultryman, 2 yrs., 24 issues	1.00
Rabbits	
Calif. Rabbits Mag., m.	1.00
Calif. Rabbit News, m.	1.00
Intern. Comm. Rabbit Journal (Angoras only), m.	1.00
Small Stock (rabbits, cavies exclusively)	1.00
American Rabbit Journal	1.00
Fruit	
Better Fruit, monthly	1.00
Eastern Fruit Grower	1.00
Dairying	
Amer. Dairy Goat News, m.	1.00
Dairy Farmers Digest	1.00
Other Specialties	
Co-operative Digest, m.	2.00
The Soybean Digest	1.50
New Agriculture (sugar beets only)	2.00
Small Commercial Animals and Fowls	.50
Modern Game Breeding, m., pheasant, wild waterfowl, etc.	3.00
Black Fox Magazine, monthly, fox, mink	2.00
Frontiers, natural history, 5 issues	1.00
Canary Journal, monthly	2.00
Natl. Amat. Minerologist, m.	2.00
Relics, m., for Hobbyists	1.00
Good Health, m.	1.00
Canary World, m.	1.50

All magazines are monthlies except where otherwise noted; prices are for one full year. Satisfaction guaranteed. All orders are handled promptly and acknowledged. Rush your subscriptions today. Remit in any manner convenient to you.

Magazine Mart

Dept. FD, P. O. Box 1288, Plant City, Fla.

Sample Copies at Single Copy Prices

Send for FREE Catalog